FORDYCE (GEO.)

LECTURES ON CHEMISTRY

No. 1.

Lectures on Chemistry by Gordon

Lect. 1st

Yesterday was given the History, Use &c of Chemistry as an Introduction to the Course, & we now come to the Division of Bodies

Bodies are divided { Mechanically / Chemically } into { Integral parts / Constituent parts / Elements / Principles }

Elements are { Physical / Chemical }

Chemical Elements are { Saline / Inflamable / Metallic / Earthy / Watery / Aerial }

The Introduction of Mechanics is not part of the branch of Natural Philosophy more than Chemistry & is referred much from Mechanics.

Chemist.

Chemistry treats of ye particular properties of a Body, by wch we can distinguish it absolutely from other Bodies, & this alone is Chemistry. whereas Treatise of Mechanics is a Description of ye General & Universal Properties of Bodies.

All Bodies are capable of a Division and this is Mechanical or Chemical.

Mechanically we divide Bodies into parts similar to one another & to ye whole mass, & these are called Integrant Parts.

Chemically we divide Bodies into dissimilar parts, differing totally, entirely from one another & from ye whole mass from wch they were divided.

Example. Iron put into a solution of Copper in ye Vitriolic Acid divides it Chemically i.e. the Iron precipitates ye Copper from ye Acid, dividing ye Compound therefore into its Constituent parts of Vitriolic Acid & Copper which compose ye Solution

It may be Mathematically demonstrated that Bodies may be infinitely divided; but that only Mechanically & not Chemically, as there must be Element of Bodies into wch when we have reduced a Body we can't again Chemically divide them but may perhaps Mechanically.

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The result of this Strict Division we call Chemical Elements & however it is impossible for us to obtain in their seperate state — These Natural smallest Bodies then are y Chemical Elements and those Elements wch we can actually divide Bodies into are called Chemical. as the Copper wch we saw precipitated was a Chemical Element of that Blue Solution but Copper itself is a Compound of Elements wch are Physical.

Chrystalline Earth & Water seem to be y most ~~like~~ Physical Elements yet they can be changed into one another as we see Water by long calcination in a close Vessel is changed into Chrystalline or Calcarious Earth — Yet here we cant say whether it is that Water has some addition ~~to~~ itself inorder to be converted into Earth, or whether y Earth has some Subtraction from itself in order to be converted into Water. Hence it is evident that we have not yet arrived at y knowledge of y last Elements of Bodies we must therefore be contented wth y Chemical Elements

Chemical Elements frequently are easily convertable into one another by Processes carried on by Nature. But no such thing can take place wth y Physical Elements wch as Sir Isaac Newton observes, are Permanent, Elastic ones &c.

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and if otherwise we should be constantly making the new Bodies in the Earth from the constant variations taking place in the Elements. and if the Physical Elem.ts either of the Copper or of Petrosic Acid which we had lately before we should by any means be destroyed, we should never after be able to obtain the Salt which they composed viz. the Blue Petrol. — Hence it is evident that there is no new substance found or can ever be found in the Earth which did not exist from the beginning of the World. Often as would seem to be new have only been overlooked & are not new created. Unless some Phys. Elem.t made by a process we know as Calcareous Earth constantly is formed by Animals yet the same sort of Earth did exist always but not in so great quantity as at present.

The Chemical Elem.ts are very numerous but the Physic. Elem.ts certainly are very few.

The Ancient Chemists anxious to find out every thing at once, supposed they had found out these Physic. Elem.ts and some as Pythagoras viz. said there were 3. others as Plato said there were 5. these have been handed down to our Age, & were said to be — The Spr. or Mercury, Phlogiston or Sulphur. Salt or Earth, Water & Fire.

We say that many Contain Earth, and it is evident that some by calcination may be converted

into

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into Earth, hence we can't demonstrate that Earth is an Element; but rather that Earth itself is a compound of some of all these Bodies, as a considerable Weight is gained by ye process. &c &c

This supposition concerning ye Elements, it was that induced Chemists to follow ye method they have hitherto done; in order to find out in what proportion they were contained in all Substances, beginning 1st wch ye Animal, then ye Vegetable & lastly ye Mineral hence the origin of these three divisions of Bodies — But we now find that we know not ye Physical Elem^ts of Bodies & can't demonstrate them as existing in any one wch has already been attended wth great disadvantage & occasioned much confusion — for Exp^le

Calcarious Earth is made by Animals, which from Vegetables & is found in ye Earth, to wch of these Classes should it be given? It can't properly be any one alone as existing in all & ye discribed in all we make a useless repetition — It has also got different names according as it is found in these different Classes as Animal terms from ye Animal it is call^d Bone Ashes from ye Vegetable Calc & Virgin Earth &c & from ye Earth, Chalk, Marl or Marble &c all of wch are similar in their medical properties. & ye White Decoction in ye shops will be as good made wth simple Chalk, as wth ye less easily obtained Burnt Harkhorn.

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Some say Shell Lime & Quick Lime differ in their Medical Properties, but both are of same Calc Earth made Caustic by ye destruction of ye fixed Air, and the Shell Lime Water is no better than that wth Common Lime. This is another reason for rejecting the division made by the Ancient Chemists.

But ye last & principle is this.

One part Lecture treated of in this way throws no light into another, for Instance. If we begin wth the mineral Alkali: hog here treat of 3 of ye Acids, viz. The Vitriolic, Nitr: & ye Muriatic, then going to ye Alkali's find ye Fixed Volatile Alkali, but this throws no light into ye nature of ye other Acids or Alkalis, but if we treat of them together & compare ye one wth the other we get a complete knowledge of em all.

The Best way (& wch we shall follow) is the treating of them under such Classes as have similar properties, as ye Saline, Inflam^ble &c. All the Saline agree in some particular properties, as ye Acids agree in some partic^r properties wth one another, and all ye Alkalies agree wth one another in some particular Properties.

We divide em therefore, (as in Page 1st) into Saline, Inflam^ble, Metallic, Earthy, Watry, & Aerial 1st the Saline as showing ye most universal connection wth ye other Substances, ye Inflam^ble as next ye

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The Chem. Elem.ts of w.ch we know a great variety, all come under these different Heads —

The Saline are such Bodies as are sapid to y.e taste, soluble in Water & not inflamable, these three properties distinguish y.e Saline from y.e other Classes

Other Substances have some of these properties, as the Inflam.ble for Exp.le: are sapid to y.e taste, but are capable of Inflammation & that distinguishes them from y.e Saline. Again. The Earths wh. are sapid are insoluble in Water & uninflam.ble by y.e Fire, these are distinguished from y.e Saline & by y.e other from the Class of Inflam.ble Bodies.

Experiment. The Fixed Alkali we see readily dissolves in Water, but throw a little into y.e Fire & it does not burn, and as we see it does not burn we conclude it does not belong to y.e Inflam.ble & as we easily solute in Water conclude it is a saline subst.ce

Saline Substances we divide into two Classes viz Simple & Compound, we shall only at present speak of y.e Simple w.ch comprehends Acids & Alkalis

Acids are such substances as will change Blue Vegetable Juices into a Red Colour, & unite w.th Alkalis into Neutral Salts, also another distinct.n is their Acid to y.e taste. Exp.t: Syr. Violets & Water w.th a little Muriatic Acid becomes Red.

Another

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Another & ye most common method given to distinguish them is ye effervescency wth Alkalies, but they do this only wth ye Fixed Alkalis & not ye Caustic ones.

Exp.^t A solution of ye Fixed Alkali saturated wth ye Vitriolic Acid they unite wth effervescence & form a Neutral Salt wch is easily concretated & Top & then soon falls to ye Bottom of ye Vessel.

Again the Caustic Alkali dissolved, & an Acid added no effervescence is caused. N.B. here we use the Muriatic Acid as ye Vitriolic Acid when concentrated will make an effervescence wth ye Water alone —

Hence the only Criterion of an Acid is its uniting wth an Alkali into a Neutral Salt (not effervescing), and ye Acid being added is not longer turned Green by ye Alkali is perfectly saturated.

These Acids may be divided into 2 kinds. The Common or well known & the Uncommon or those wch are yet but little known. Of ye first kind there are 4.

The first of ye Common is ye Vitriolic whose Specific Gravity is great & is not Volatile.

The Nitrous Acid, wch is fuming pungent & of a dark Yellow Colour.

The Muriatic, wch is also fuming & pungent but of a pale yellow colour.

Lastly The Vegetable wch is clear transparent & little pungent —

The Un-

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No. 2. The Uncommon are 8 The Acid of Tartar is
is solid & soluble in Water only in a small proportion.

The Acid of Ivory or that got by the Distillation of Vegetable
substances differs much from ye other Vegetable.

The Volatile Acid differing from ye Common Volatile
in having a strong Pungent smell & into Volatility.

The Acid of Amber is solid also & got in Crystals

The Acid of Borax differing in its properties from the rest.

The Acid of Ants. The Animal Acid, & the Native
Vegetable in its pure form — thus far ye 9th divis^n of Saline Subs^ces.

The Second Subdivision of Saline Subst^ces is
into Alkalis viz. such as turn Blue Vegetable juices
Green, Purple in Acids into Neutral Salts.

Ex^ple Syr^p of Violets wth a solution of an Alkali is
made into a beautiful Green upon adding an Acid
this colour is again destroyed.

The Alkalis are only 3 and may be divided
into ye Fixed & Volatile.

Of the Fixed there are two The Fixed Vegetable & y^e
Fixed Fossile Alkali what ye Ancients call'd Natron.

Of the Volatile there is one & is got by putrefaction
from Vegetable as well as Animal Substances.

NB Specimens of all these are shown as well in their Caustic
as mild form — Boerhaave & Hauchius deny
the Caus^tic Volatile Alkali to be an Alkali because it is
neither got in a solid form nor does it shew any in its
but it is evidently done by its Neutralizing Acids & the
other dry Saline Salts or Bodies —

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and the said certificate that the surface was covered
with a luminous vapour

We come now to ye Class of Inflammable Bodies wch are easily distinguished from all ye other Classes, by being capable of Inflammation, flaming inflamed in one part communicate it to ye whole Drop. (a)

Exp^t. Alcohol set on fire at one part will burn till ye whole is consumed. Hence here we may remark that it is ye Vapour wch is inflamed wth fire not touching ye Surface of ye Alcohol as we see thro' ye Glass. Hence such Substances as are easily made into Elastic Vapour and this Vapour capable of Inflam^n may be called Inflammable Bodies.

In these Bodies there is only one part wch is Inflammable all ye rest is not, and this one has by the Chemists been called Phlogiston, but as we never yet could obtain this seperate from ye other parts we know nothing about it, Hence we treat it as a Physical Element.

Inflammable Bodies are divided into three Heads viz. Oils. Sulphur, & Ardent Spirits under this head we treat of Sugar, wch however is certainly a Chem^l Elem^t. But as this is ye foundation for Alcohol & Ether, & Dulce & Empyreumatic Oil we bring it in here.

Oils are such Substances as are inflam^ble and not soluble in Water. Exp^t. Oil we see burns upon the application of fire but thrown into Water is not dissolved but swims at ye top. Hence any Substance that burns yet swims thus on Water may be call'd an Oil.

Oils

Oils are either fluid or solid in our Atmosphere but we shan't divide them here as a very little heat greater than that of our Atmosphere easily makes the most solid ones fluid, as we see in Camphor, & Spermaceti

Oils are Express'd, Essential, Empyreumatic, Fossile, Of Dulce, & Other.

The Express'd are viscid, Insipid, Inodorous, & not Volatile. all other Oils are volatile & odorous.

Essential Oils got from Vegetables are always volatile & Odoriferous, to this Head we reduce Balsams & Resins. By Expression we reduce Animal Oils or fats.

Empyreumatic Oils are such as are got by distillation of Animal or Vegetable Substances, & have a particular burnt smell differing from ye other sorts.

Fossile Oils are such are always found in ye bowells of ye Earth either in Pit Coal, or in the form of Bitumen or in a still more fluid one called Naphtha

Of^n Dulce is an Oil got by ye distillation of Alcohol & ye Vitriolic Acid of a particular sweet smell in w^ch & some other properties it differs from all ye rest.

Ether is an Oil we are but little acquainted w^th. & is got by ye distillation of same Acid & Alcohol & is of an agreeable smell & ye most volatile of any known substance.

Sulphur an inflammable substance is solid insoluble in Water, in burning emits a particular disagreable smell wch is sufficient to distin-guish it from all other Substances.

Alcohol.

Alcohol & last of all Inflammable is not an Oil as being soluble in Water hence may be distinguished.

NB By the term Spirit or Ardent Spirit we shall hereafter always mean Alcohol. The term Spirit being given to so many substances has occasioned great confusion in Chemistry. It has been given to all volatile Liquids of Vegetables, Nitre, Sea Salt & Vinegar, (when distilled from Vegetables) also to distilled Water, but here we shall reject & confine it to Alcohol alone.

The Next Class is that of the Metals.

These are substances of considerable Specific Grav. when broke always shine, are not inflammable, are insoluble in Water, are fusible in a fire, and after fusion return to a compact metalline form. by these properties they are easily distinguished.

They are either Volatile or Fixed, the only one that is fixed in our Atmosphere is Mercury, this however is capable of being made solid by a certain degree of cold.

The Solid ones have been properly divided into Malleable or true Metals, & Unmalleable or Semi-metals. The Malleable are Gold, Silver, Copper Iron Tin, Lead.

The Semimetals are Zinc, Bismuth Regulus of Antimony, Regulus of Arsenic, Mercury Platina Cobalt Nickell.

The next Class is that of Earths

Earths differ from Metals in being insoluble from

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from ye Inflammable in being incapable of burning from metals tho' like them fusible, yet not returning into ye same substance, but into Glasses.

Earths are therefore called substances insoluble, not inflammable, & easily changed by simple fusion into Glasses.

They are of 3 Classes, ye Absorbent, Argillaceous & Vitrescible.

The Absorbt are easily soluble in Acids, Exp.le Chalk put into Water & ye Marine Acid added is dissolved.

The Absorbent are of 3 sorts ye 1st such as are calcineable into Lime, also found in Vegetables as in Calcar. Char., also Chalk, Stone, Ashes & Shells commonly the Head

2dly Magnesia, & ye Earth of Alum or Mineral

The Vitrescible are such as are insoluble in Acids, tho' the 1st is often found in regular Crystals. This also & ye Mineral Earth tho' it has in many different colours wch are communicated to it by the different Metals wch it chaffens & colour mixed.

A Species of the Jasper a small coloured stone is found by pulling into Acid tho' as insoluble and Common Flint.

Flint is ye last & is such as is neither fusible nor Acids nor does it strike fire wth steel, but is easily powdered by pulling it into Water alone wth none of ye others are —

The next Class is Water wch is sufficiently known to make a Description of its Properties unnecessary.

The

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The last is the Aerial of which we know but little only are sure this of 2 Species of air the Common Atmosphere and Fixable air which we set at liberty from Bodies particularly by Alkali by means of an Acid.

This then however imperfect & uncertain is all we know of the Physical Elements, and so far are we from knowing that there is only five, we know not but there may be certain 60 or 70.

The Compounds of these Bodies are what we find universally. The Organic whether Animals or Vegetables are Bodies made by Mechanical means. Those made by Chemical means are such as Salts of Steel for instance which may perhaps contain many of these Elements.

Others are found in the Earth as Asbestos, Gypsum &c. Metals which we also unite to one another into different Bodies called Amalgams as Brass made from Tine & Copper &c. —

Chemistry then teaches us how the Elements of Bodies may be separated, in what circumstances they may be combined to others & lastly what are the properties of Bodies & of their Combinations.

Hence we may see how necessary for the practice of Physic a Knowledge of Chemistry as well as of Nat. History, Anatomy, &c. are. —

Vel.

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Lect: of 3d.

Chemical Changes are produced by { Combination or Seperation —

Mechanical by Alteration of Texture.

Combination depends upon Chemic Attraction which can only take place on Bodies fluid or in a state of Vapour.

We spoke yesterday of the Elements as all Chemical Operations are either composing Bodies by uniting these or decomposing Bodies so as to get these seperate — All the Operations in Chem: then are in order to produce Changes in Bodies, or else we want to produce a New Body whose properties may differ from anything we know

Changes are either Chemical or Mechanical & all Changes are either by Combinations or Seperation of the Chemical Elements.

All ~~Mechanical~~ Chemical Changes are produced by Alteration of the External Texture or Internal Structure Exp: By add the Chalk to the Muriatic acid a salt is produced & we make a change of the Chalk & Acid to this particular state.

Mechanical Changes are like the Chemical sometimes

See Pl.

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Ex.ple A Round Body may by ye Operation of its convex Sides be changed into a Wedge. Also

From Steel & Iron have ye same General Properties excepting ye hardness of ye one & softness of ye other wch is owing to ye greater condensation of ye particles, the one being soft & Malleable the other hard & brittle. The Particles of Iron are large & those of Steel small, hence they have not so much hold of each other as those of ye Iron have, wch is more evidence as large hooks if once is applied will be sooner in being made straight & took their hold than two small ones. Hence we see how Chem & Mech changes are produced.

From these Appearances some have said that ye Physical Principles are not permanent but may be changed putting ye Body into certain Circumstances, without Addition or Subtraction. As Lead for Example exposed to great Heat is calcined into Litharge or Minium. Hence say they Chem Changes are without Addition

But in this same Lead in calcination tho' we don't apparently make any addition yet there certainly is one as ye Lead gains much in its Weight, & it is very possible a Seperation may take place at ye same time. Hence either from an increase or loss of ye wch prove an Addition, or Seperation.

Thus all Chem & Changes are produced and all that are not thus produced are Mech & depend upon ye Organization of ye Body.

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No. 3

There is a certain particular power by wch Bodies unite w th one another distinct from the Mechanical union, and is called Chemical Attraction as we saw the Mat: Acid & Chalk by Chemically Attracting each other particles were united making a third Body called Neutral Salt or Liquid Shell hence this power is Attraction, & this Combination is what we call Solution and to one of y Bodies Chemists have given y Name of Menstruum & to y other that dissolves it for y sake of a distinction

Combin & Solut. often men to period upon no Power wch we call Attraction

Bodies may also be combined Mechanically i e by means of their being reduced into exceeding fine particles, & then one Body is kept suspended in y other by its Viscidity & this is called Mechanic: Solution.

Exp: Oil & Mucilage of Gum Arabic if just poured together no solution takes place but if shaken they unite into a uniform Liquor call'd a Mech: Solut:

This then is y distinction between y Mechan: & Chemical Combination or Solution.

The Chemical depends upon a power in the Bodies themselves of uniting w each other. But the Mechanical has no power of uniting but only when in small particles is suspended by the Viscidity. N.B. this is also call'd a Mixture as well as Mech: Solut:

In the Chemic: Combinat: a new Body is formed differing in properties from y Bodies wch compos'd it.

But

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But in the Mechanical & Compound retains ye properties of ye ingr. wch composed it. Hence some have said that ye Elements are changed as well as ye Properties. But this is not true for they really exist Essentially tho not Formally, and as a proof that they do so we can always seperate ye one from ye other

Exp: Chalk. Muriatic Acid & Water intimately united, yet we can seperate each of em again & retaining all their properties wch proves that they did then exist in ye Compound as the Chalk when precipitated wy same white substance as before. It is ye fixd Alkali wch we add in order to precipitate ye Chalk. In the same manner we seperate the Muriatic Acid & Water from ye Chalk by adding ye Nitric Acid wch unites wth the Chalk & falls to ye bottom of ye Vessel leaving the Nitric Acid & Water above as proves by Order of Bicrets being changed Ched. & as another proof of their being so pour a little Nitric Acid into each and dissolve the Chalk wch was precipitated by ye Alkali, that has no Effect upon the other.

Hence we see that Chemical Changes are produced by means of Combination that depends upon Attraction & the Elements are changed but not destroyed or as ye Schoolmen say they exist Essentially tho not Formally

In the Chem. Combin. the properties of Bodies are destroyd but in ye Mechanical as not Exp. In the Oil & Gum Arabic. the Oil was inflammable & ye Gum Vescid Tare so now ye Water is poured so as to lessen ye Vescidity of Oil wch swimbs of top — Attract.

Attraction is a power inherent in two particles of Matter by wh they approach each other if seperate or if touching each other they stick. In these Expressions the French have no phrase no meaning but we shall prove hereafter that they have.

Attraction is of several different kinds, perhaps there may be more but we only know of Five. viz. Gravitation, Cohesion, Magnetism Electricity & Chemical.

Gravitation is a Mechanical power inherent in all Matter whatever, by wh any two particles if seperate will approach each other & if touching one another will stick together. Ex.ple if into a Bason of Water a fresh Cork is put, it will not remain in ye Middle but will gradually get to ye side of the Bason. But if there was no such thing as gravitation ye Cork would remain in ye Middle. This is one species of Attract.n & it is by this that all Bodies fall to ye centre of ye Earth, & by this it is that ye Planetary System are kept together.

Cohesion is that particular property by which two Bodies being applied together, stick contrary to their Gravitation Ex.ple two pieces of Lead w.th smooth surfaces rubbed together are made to stick.

Electricity is a Chemical power only inherent in particular Bodies, making particular Bodies approach nearer them or themselves nearer ye Bodies. as we see in ye Electric Machine when charged.

NB The 2 former Att.ns were Mechanical inherent in all Matter, but this is a Chem.l one inherent in few only.

Magnetism

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Magnetism is a species of Attraction by which Iron approaches a particular Iron wc called d'Load-Stone & Iron itself may have this power communicated to it. This is also Chemical.

The last is what we more properly call Chemical Attraction, it is a Power inherent in Bodies, by wh if they are applyd together in certain circumstances, they will unite intimately ye smallest particles of ye one wth ye smallest particles of ye other, & in this it differs from ye others.

The Mechanical Theorists have endeavoured to demonstrate, that this did not differ from ye other Attractions, but we shall endeavour to prove that it does.

1st Chem. Attract. differs from Gravitation in this; that Gravitation is inherent in all Bodies but it's not every Two Bodies that have a Chemic Attract for each other.

But the Attraction wh they say approaches nearest to ye Chem. Attract is that of Cohesion & Many have said they are ye same. But in order to confute this ye knowledge of a few of d Laws of Cohesion are necessary.

Allways ye more points wth wh a Body touches another ye stronger is their Cohesion. Hence if we rub two Bodies together we make them touch in more points & ye Cohesion becomes greater, and from this one Law we shall prove that Chem. Attr & Cohesion differ. and

We shall endeavour to prove that in Chem. Attract. the Menstruum don't touch, some parts of d Solvend as ye parts of d Solvend do itself. Exple

Exp: Chalk by Muriatic Acid being poured upon it is easily dissolved tho' ye Particles of y^d Chalk touch one another in more Points than ye Particles of y^d Chalk being in a Lump. &c.

This is yet further proved by ye Vitriolic Acid & Iron. for all Bodies having great specific Gravity their particles must touch each other in more points than others of less Spec: Grav^y do, as Iron has more matter & is Specifically lighter than Wood. and the particles of Iron touch one another in more points than those of Vitriol of Iron do wch is Effect Spec: Grav^y.

Now if Chem: Attraction was ye same as Cohesion & Vitriolic Acid would never disjoin^t wch had so strong Cohesion. Exp^t Iron in powder & Vitriol: Acid added.

Another & a more simple proof is that Bodies, who have a strong Attraction of Cohesion for each other have no Chem: Attract^n as Cobalt & Bismuth wch scrub'd together cohere, yet can't be Chemically united. Also a Drop of Water in ye bottom of a Glass sticks to it but can't Dissolve y^d Glass.

That Chemical Attract^n differs from Magnetism & Electricity needs no proof.

Thus have we explain'd the Power by wch Bodies are combined Chemically, & come now to ye Mechanical Combination.

Bodies are combined Mechanically only by friction: Hence it is ye Viscidity of Solution of Mucilage that suspends the Oil:

Exp^t

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Exp.t All Bodies in falling down thro' any fluid meet w.th friction, as we see a Feather is longer in falling from any Height than an Equal weight of Gold &c, because the Surface is greater in the Feather for y.e same weight. All Bodies having their motion retarded by Friction.

Now in dividing Bodies minutely we increase the Surface hence y.e Friction is greater. So that if we divide a Hundred into 2 thin pieces it will be as long (almost) in falling thro' Water as before, if into 4. fourtimes as long & soon if it is beat out into a thin Leaf y.e Friction is so great that it is kept suspended in y.e Water. So that we see even the most solid Bodies may be suspended Mechanically. It is this way Gold has been mixed w.th a fluid & given as a Universal Medicine &c.

We shall next take Notice of some few Circumstances relating to Chemical Attraction.

1.st Chemical Attract.n can't take place unless one or both Bodies are fluid. As y.e Nitric Acid was fluid & y.e filings of Iron not; & y.e Combin.n ensues in a place.

Again Sal Ammoniac & Copper w.ch of dry when mixed, can't be united, but if Water is added to make y.e Sal Ammoniac fluid y.e Copper is dissolved into a fine Blue Liquor.

Also Lead & Tin have Chem.l Attract.n for each other yet can't be united like either of 'em is fluid, but if put into a Crucible & fused unite into a mixed Metal called Pewter.

Another way in w.ch Chemic.l Attract.n takes place is in y.e state of Vapour.

Exp.t

Exp: The Caustic Pot Alkali & Nitrous Acid each emitt fumes which alone are hardly to be distinguished by the Eyes, yet if these Two Bottles are held together the fumes unite & then are easily seen.

It is difficult for apts to account why fluidity should be necessary for Chem. Attraction, but tho we know nothing of it being so in fact, yet we could easily prove that it must be so.

Exp: a Piece of Iron & a piece of Lead of equal bigness could never touch one another but in their surfaces & supposing these should be dissolved they could not be removed unless fluid. This is one Reason.

Whether there is any other reason is uncertain perhaps Fluids touch one another in more intimately than Solids can. But this can't be the reason, as two solids touch one another very intimately in one part.

Bodies in this Attraction of Cohesion so great as not to be much affected by Heat of the Atmosphere are Solid, but those whose Attracn is lessened much are Fluid. This is probable from Chem. Attraction between Solids & Fluids that the latter have their Attrn very considerably affected by a smaller degree of Heat. That Heat diminishes the Attraction we daily see in making even Metals fluid. Also if we take a piece of Brass or Iron of equal length & heat one we make it longer than the other, by the particles of it is composed being farther removed from each other & their Attraction less.

Therefore

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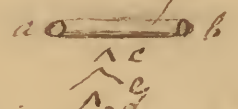
Therefore if ye Attraction of Cohesion is so strong in our Atmosphere that one particle can't be parted from another, that is a Solid. But if that Attraction is not so strong, ye particles are easily removed, it is a fluid & this happens when Heat being sufficient to remove the particles from each other it can't now touch in many points.

Another instance we have of Heat & Cooling true is seen in a Body changing from a fluid to a solid form, Exp. Tin made fluid by Heat & put into a Mould appears when cold solid which fluid, such when it is cold we see it has a dent or impression on ye top, owing to ye Attraction of Cohesion being greater now than when Hot.

The other state of ye Attraction between Bodies viz: in Vapour is probably illustrated by Electricity, for altho' Electricity occasions two Bodies to attract each other, yet it only is a certain distance, & they can't come nearer unless a greater force is applied & that dissolving they return to their former place.

Exp.



Let ab: represent a Glass tube full of Electric Matter and (d) a Body capable of being attracted by it w.h ye first to touch will be drawn to (e) and if we should touch it nearer as to (c) & leave it there it will immediately be repelled to e) again — So probably in ye state of Vapour one particle has an attraction for another & also a Repulsion, and ye Attraction of Cohesion must be weak when ye particles are at such a distance

Chem. Att.n

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No 4

Chemical Attraction is a power inherent in particular Bodies only. for all Bodies are not possessed of it. Camphor has a Chemical Attraction for Alcohol but not for Water. as we see upon mixing the two each Camphor is dissolved in Alcohol but swims in Water.

Again Sea salt & Water have a Chemical Attn but Sea salt & Alcohol have none, Salt not being dissolved in Alcohol. and this proves that Chem. Attn does not depend upon the size or figure of the Particles, or pores of the Menst.m & Solvend whereas The Mechanical Philosophers have said that the Pores of the Menstruum were fitted for the Particles of the Solvend. but this can't account for Chem. Attn. As in Camphor since its pores are large enough to admitt the parts of Alcohol & not of the Water. & vice versa w.th Sea salt whereas the particles of Alcohol are smaller than those of Water. Again.

Suppose it depended upon the Shape of different sizes of the particles, whatever hard Small particles would be a Universal Solvent of Bodies, but this is not the case as there is no Menstruum wch dissolves all Bodies. And if it were thus performed, we should be obliged to imagine an Eternal twisting & twing in order to make such particles come in contact — & supposing the Pores of the Solvend to be filled by this Menstruum it would not be dissolved but only Specifically Heavier only, and in the same Mass. whereas as the Menstruum has a power of dividing the Solvend in pieces

Let the Iron & the Nitrous Acid the Acid dissolves it with great violence —

By

By this we see that the properties of Bodies are more to be expected and Compound Changes being produced by Combination & Separation.

Lastly Nitre differs in its properties from the Nitrous Acid & fixed Alkali its component parts.

1st the Acid was fluid but Nitre is solid.

2dly both Acid & Alkali if exposed to the Air attract moisture from it but Nitre does not.

3rdly The Acid is volatile & flies off in fumes but Nitre does not.

4thly The Acid with Water generates a considerable heat so does the Alkali but Nitre & Water generate a considerable degree of Cold.

5thly The Nitre deflagrates but neither of the other two do.

6thly The Alkali & Nitrous Acid are caustic when applied to the Skin. but Nitre is perfectly Mild and incapable of corroding and hurting the Body.

Thus we have endeavoured to prove that Chemical Changes are produced by Combination & Separation. & Mechanical upon Alteration of the Texture.

Lect. 4th

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No. 3

Lect: 9 L.

The Combination of Bodies depends upon Chemical & Elective Attractions, the Spirit we spake of yesterday Lecture & came now to Elective Attraction.

Seperation of ye Elements of Bodies } depends upon { Elective Attract.n or ye Heat of fire

Elective Attract.n as we said also of ye Chemic. only takes place in fluidity or Vapour.

All Bodies have not Elective Attract.n between each other.

Ex.ple Water ℥oj will dissolve ℥i of Nitre so that it can take up no more Nitre, yet even then will dissolve ℥ii of sea Salt and when it can take up no more sea Salt will still dissolve ℥ii of Sal Glauberi. again

Sometimes the Menstruum will dissolve only one Solvend, & not take up another afterward w: would dissolve in it before; & thus it dissolves either indifferently but will not both at once & unc. Ex. is two of sorts

Ex.ple

(a) or if Silver be dissolved in a Nitrous Acid & a Mercurial-
-silver added it precipitates the Silver in a white powder
in the figure of a beautiful Ramification called Arbor Diana

(b) a Compound Effervescence takes place in Ebullition

Ex.ple ℞ Sal Glauberi dissolv'd in less than ℞ of Water, will not take up any Vitriolated Tartar. Again

If to a Solution of Sal Glauberi (which is the Vitriolic Acid & Fix: Alk:) you add the Fixed Alkali, no change will happen, the Fossile will not be decomposed; & Vice Versa, the Fossile would not detach ye Fixed Alkali, in these Exp.ts no Elective Attraction taking place.

? But if one Solvend be put into a Menstr.m and dissolved by it, & another Body w.ch has a greater Attraction w.th ye Menstruum be added, the Solvend w.ch was before taken up by the Menstr.m will now be detached from it, and this is called, Elective Attraction.

Ex.ple If to a Solution of Camphire in pure Alcohol we add Water, the Alcohol having a greater Elective Attract.n w.th ye Water, the Camphire will be detached.

Again. If (a) to a Solution of Quicksilver in ye Nitrous Acid we add Copper, ye Quicksilver will be precipitated by ye Copper uniting w.th the Nitrous Acid, (a) and if to this again we add Iron w.ch has a still greater affinity w.th ye Acid, the Copper itself will be detach'd: &c.

We

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The ingenious Stahl a German Chymist discovered
this

We have no Theory, by wch we can tell a Priori the Elective Attractions of Bodies, or on what it depends, but Experiments alone can determine this. from Experiments therefore it is that Chemists have made a Table of Affinities

A Double Elective Attract.n considered (a)

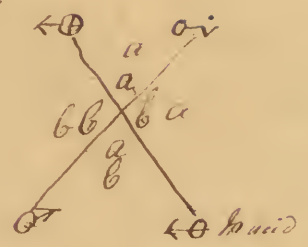
Let Iron be dissolved in the Nitrous Acid and the Fixed Alkali in the Muriatic; the ⊕ having a stronger affinity wth ye Fixed Alkali will attract it to itself detaching the Muriatic; whilst ye Muriatic having a strong affinity wth the Iron will unite wth it.

For instance; To explain this and find out ye force of Attraction by a Diagram

Draw a Line and crop it in another wch shall represent two Moveable Balances, upon the opposite ends of one put ye two Solvents and on ye opposite end of ye other ye Solvends in the Table of Affinity find out wch has the stronger Attraction, put an a in ye place which shall represent the stronger Power, and a b. for ye weaker Power and proceed till you find out the Comparative Power of ye Whole.

Thus

Thus for Ex:ple



The Nitrolic Acid & Fixed Alkali joined in ye Pole have a greater Affinity than ye ~~Fixed Alkali~~ & Nitrolic Acid. Let ye stronger power represented by a: a be placed between these two w:ch have ye greatest affinity w:ch is ye ⊖ & ⊙ and ye weaker represented by b: b be placed between those two w:ch have ye less ye ⊖ & ⊙. The ⊖ & ⊙ have greater affinity then ye ⊙ & ⊖. a: b:: ⊙ & ⊖ have greater affinity than ⊙ & ⊖ a: b:: . The ⊖ & ⊙ have greater affinity than ⊖ & ⊙ a: b: ye 3 a's will tend therefore to bring ye opposite ones off their Pole together. consequently the ⊖ & ⊙ & ⊙ & ⊖ will be united.

No Chymical Attraction takes place only in Amicitia or Favour so likewise will Relative Attraction whether simple or compound. Thus Ex:ple if we add fixed Alkali to sal Ammoniac (w:ch is ye Volatile Alkali & Muriatic Acid) both dry & in powder, no new combination will take place but if both be boiled in Water ye Volatile will fly of in a pungent smell.

Again. Antimony, & fixed Alkaly have no attraction till ye Antimony is made fluid by fusion in ye fire & then ye Alkaly will attack ye Sulphur & make a Hepar sulph. whilst ye Regulus being detach'd will lie in a compact Crystal full to ye bottom.

Lect: 20 ye 5:

Fire separates
by degrees } Liquation
of } Freezing
Vitrification
Vegetation. } Evaporation.
destroying of Attraction?

Liquation what? Liquifying Bodies

Bodies when combined require a greater degree of heat to liquify them than when separate.

Exp. Sulphur is easily melted by itself but when joined to ye Regulus of Antimony or in Crude Antimony requires as great a degree of heat to melt it as Antimony itself does. i.e. greater considerably than before

(a) The greatest ~~[illegible]~~ advantage of this in Cold Countries
ing liquids by being so separable from Water might be
concentrated without being liable to heat and Evaporation
as they do in the common way. So also might Alcohol-

(b) of this we have an Instance in Ointments. The Oil so
after into their composition was ~~[illegible]~~ in over the
Atmosphere but the Ointment requires more heat.

Again. Some when Combined may be separated from ye others by their being rendered fluid in a less degree of Heat. Exp: Copper & Lead melted into a Mass, may be separated by exposing to such Heat as will make ye Lead fluid w'ch will then burning out in ye Mass.

But Bodies don't always retain the Properties of being separated in a certain degree of Heat after Combination. (6)

The second Method of Seperation is by Freezing. Some Bodies being capable of becoming Solid in a greater degree of Heat than others.

Exple. If we Expose Water and an Acid to such a degree of Cold as will make Water freeze if Water will congeal & leave ye Acid, the Water being capable of freezing in a greater degree of Heat than ye Acid. (a)

Again. Water & Alcohol will also be separated in like manner.

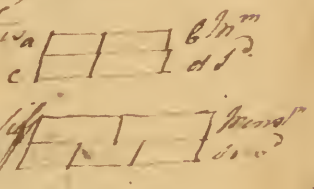
The third Method is by Crystallizn. Water being capable of dissolving a greater quantity of some Bodies when hot, yet will let them fall again when cold.

Exple. Nitre dissolved in Hot Water, as ye Water cools ye Nitre shoots into Crystals except a little quantity of it w'ch remains dissolved in ye Water.

The

(a) Chemical Attraction is always destroyed by means of a very great degree of Heat. and this greatly affects Chemical Operations, & has this singularity with them tho' a degree of Heat sufficiency to make any Bodies unite & form a compound yet if too great Heat be made use of it's Attraction is destroyed as we see in uniting the Vitriolic Acid & Q to make Fixt Mineral.

(b) One possible way in wch a Menstm happens to dissolve more than solid only Heat then in fold may be easily effected having its particles further separated by the Heat capable of touching more of the Solvend. thus supporing a: b: 2 particles of a Menstruum united with c: d: 2 particles of a Solvend. yet if 1 2 particles of a Menstm are separated by Heat again & lower figure, they may be made to touch three of the Solvend



The 1st method is by Vitrification. Some Bodies vitrifying in a less degree of heat than others

Some also being capable of Vitrification others not.

The Lead is easily Vitrified, whilst Silver is not capable of Vitrification. If we expose a mixture of Lead & Silver to a proper degree of heat, the Lead will be vitrify & the Silver be left in a solid form. (a)

The 2d & most singular separation is by Vaporation, or Attraction by means of heat; as in Distillation of one part of the compound being more easily rendered Volatile by a less degree of heat than the other, also in the Antimony wch was exposed to heat & Sulphur was more easily volatilized.

Another instance is in ye making of Oil of Vitriol by Exposing Green Vitriol wch is made of Sulphur & Iron to a certain degree of heat, by wch means the wch is easily rendered Volatile, viz by a heat of 600 degrees is forced over leaving Iron in a Calx. This separation differs both from Fusion & Vitrification.

Nor tho' most Menstrua dissolve a greater quantity of Bodies when hot, than when Cold, yet the Power of Attraction is weaker. (b)

Sh.

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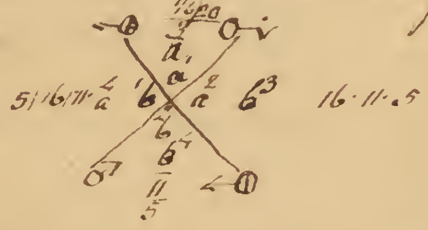
Of this Principle ye Chemists make great use as in y^e obtaining of the Nitrous Acid by putting Green Vitriol & Nitre together into a Retort in w.^ch ~~the~~ Compound Elective attraction shall take place, and the Nitrous Acid fly over. as an Ex.^ple see the following Diagram



call aa = 20.
ab = 16 × by 2 = 32
bb = 11·

20 + 11 = 31

This Diagram is explain'd as in yesterday Lecture: wth this Gen: Rule:

Always when 2 a's are opposite to 2 b's there y^e attrac:^n is weakest, and y^e a b's y^e strongest:

Or in other words, The very strongest attraction tho' assisted by the weakest, is overcome by two attractions of a like degree combined, tho' neither singly was equal to it.

Lect.^re

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Operations are made degree of Heat compared
freezing. Tin a great Heat Elegaction. & destroying
of Allraction under form of Vapr of the mechanicalday

No 6

Lect.re 6th

On y.e State } Operations on Bodies

Fluid in a } Small or Great } Heat

In y.e state of Vapour.

In a small Heat; Operations are } Solution, Precipitation, Chrystallization, Fermentation

Solution is Mechanical & Chemical } in it occur } the Menstruum, Solvend & Saturation

Solution is performed by } Addition, Agitation, Division of y.e Solvend, Heat —

Operations are performed on Bodies, either in a Fluid state or in form of Vapour, also Either these are Fluid in a Small degree of Heat or greater.

1st Water & Acids are fluid in a small degree of Heat,

2d Sulphur & Metals in a greater degree.

Operations in a small degree are as above on y.e State Solut.n

(a) and if one body is solid & suspended in the other so that ye whole shall appear uniform making either one solid or one fluid

(b) and differs from chemical in their being no attraction between ye Particles of each

(c) Mechanical Solution is of 3 kinds

1st When two bodies are mixed ye particles of each rub easily slipping over ye other & mixing with each other

2dly when a body is so much divided that it is kept suspended in a fluid on account of ye friction with ye air against ye fluid. — All dissipation encreasing ye surface in proportion to ye solid contents as in Caustic Calcareous Earth (Quicklime) & Water.

ye 3d is when a fluid returns another after agitation by means of its viscidity as Blood & Gelatine

(d) The second sort of Mechanical Solution is very like ye Chemical. As we see in ye suspension of Calcareous Earth in Petrifying Wells. wch is but this suspension & not a solution so is proved by ye Calc Earth falling if ye Water is exposed to ye air for some time

Solution is ye Equal Dispersion of any Body thro' another. (a)

Mechanical Solutn is a suspension of one Body in another (viz a Solid in a Fluid) by means of a small division. this also is called a Mixture. (b)

Ex: ple Clay & Water, the Clay being reduced into smaller particles is suspended in ye Water.

Chemical Solution is an Equal Dispersion of one Body thro' another (a Solid viz thro' a fluid) & suspension in ye other, so that it appears homogenous & of equal texture. & this happens by an Attraction of ye Particles of ye one to ye other. (d)

Ex, ple A Piece of Zinc (unpowder'd) put into ye Vitriolic Acid is dissolved by it & this solution is quite Clear, contrary to ye Clay &c.

Mechan: Solution therefore is only a suspensn of one Body in another by its division into small particles. And here it is worth while to remark that a Body of Greater Specific Gravity falls thro' others of a less, if not prevented by adhesion of ye Particles as in Solid, or Friction in a fluid.

Ex: ple a Piece of Gold, as a Guinea for instance whose Specific Gravity is very Great, if split & put into Water does not gravitate, so much.

as

(a) The resinous part of ye Opium makes a Chym. solution wth ye Alcohol & ye Gummy part a Mucilan. wth ye Water & as neither substance is soluble in the menstruum of ye other we are obliged to put up^n ye inconvenience of ye gummy part settling

(b) The second mark regards the method of making ye solution, ye Mech. advantage depending upon trituration or division of ye particles of ye solid, but ye Chem. not as in ye lime & Water wch we were obliged to make —

the Guinea dwell, on account of ye increased surface, whereby the Friction wth ye Water is increased; & further the surface may be so far increased, as we see in Gold Leaf, but it will scarcely swim in Water, ye Friction being so great.

Tho' both Mechanical & Chemical Solution are easily apprehend, yet when one Body is one-ly dissolved in another we cannot say which it is by Mech^n or Chemic^y. Hence some have been induced to say that there are degrees in the Mechan: & Chemic: Solution, that are Solution is Mechanical, for ex^ple in Gum Arabic we cannot say w^ther it Gum is sav'd by the one or ye other, for if you hold to stand it Gum will fall to the Bottom. But it is evident that there is such a thing as a Chemical Solution, in as much as some Bodies or Solvends unite wth a Menstruum, by an attraction contrary to that of their Gravity. To distinguish ye Solution & Mechanical Solut^n is fory^e most part turbid whilst ye Chemical is transparent & uniform, the first happens from shaking, ye Solv^d & Menst^m ye Second by Attract^n tho' Bodies were not mixed, as Zinc in a large piece but into ye Vitriolic Acid is dissolved without agitat^n. (6)

The Mechanical deposites ye Solvend, whilst ye Chemic: does not.

The Chem:

(a) Sub.^ce Vitriolic Acid & Water generate great heat.

(b) The Menstruum had its name from Paracelsus Monarch, alluding supposed that it contained the necessary to make a Solution.

The Chemical will pass thro' Paper if diluted, without separation as of Lead & Lead. This is call'd Filtration.
The Mech: Solut^n of Clay will not without deposit^g the Clay, as is evident by ye Water being clear.
But that the Chemic Solut^n of Lime passes the Filtre impregnated wth ye Lime is evident, for if we add ye fixed Alkaly ye Lime will be precipitated.
Another Distinction is that ye Mechanical never generates Heat or Cold upon mixing, whilst ye Chem: does.
In Solution ye Bodies are distinguished by Menst^m & Solvend. (6)
In a Solut^n if one Body be Solid & ye other Fluid let ye Fluid be called Menstruum & ye Solid Solvend only for a distinction sake & here pred^d to avoid confusion.
If Both Bodies are Fluid, but ye one in less quantity than ye other, let that wch is in greatest quantity be called ye Menstruum & ye other ye Solvend. Exly
Give dissolve 4th: 2 oz of ye Oil of Amber & pass it in 3j of Sp^t of Wine, let ye Sp^t be ye Menst^m & ye
If Both are Fluid & mix in quanities indifferent reciprocally, whether Menstruum or Solv^d as Water & Sp^t of Wine coloured a little wth Cochineal to make it more Delicate.
In most Solut^ns ye Menstr^m can only take up a certain quanity of ye Solvend & this we call Saturation or the Solv^d can only be united to a certain quantity of the Menstruum - Ex: ye Nitrous Acid & ye Fixed Alkaly dilute -

again

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(a) so that an integrant part of it shall be joined to each integrant part of the Membranous

again. If we pour y Nitrous Acid upon Chalk only a certain quantity of the Chalk will be dissolved & this is called the Nitrous Salenites.

The Acid thus saturated retains none of y properties of an Acid. viz it won't turn Syrup of Violets Red but if we add a few drops more of y Acid it will immediately turn it Red. & by this means we know when there is in ye Solut. quantity. Yet y Syrup remains blue if it is agitated.

The same happens in a Solut. of y Salt Nitri the Alkaly can only be united w.th, or attract a certain quantity of y Acid, & y Acid only attract a certain quantity of the Alkali, & this Solut. of Nitre does not turn the Syrup Violet green, but if a few drops more of the Alkaly be added it makes it green. This is the 1st manner of Saturation where y Menstruum & Solvend can only be united in a certain proportion w.th each other

The 2 is when y Menstruum can only dissolve a certain quantity of y Solvend, but y Solvend may be united to a great quantity of y Menstruum

Ex.le Water ℥vi can only dissolve ℈ii of Sea Salt but one Grain of Salt may be united w.th a Gallon of Water. Again

A few drops of a solution of Silver in y Nitrous Acid dropp'd into distill'd Water will remain clear but by y Addition of a small quantity of Sea Salt w.ch contains y Muriatic Acid, y Silver is precipitated.

Here y properties of y.e Acid is [illegible]

Here

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Thus the Properties of the Bodies combined are not changed, viz. Salt has all the properties as pungency &c. Taste &c. & Water is fluid clear and will dissolve other Bodies.

The 3 is when the Menstruum & Solvend may be combined in each other in a quantity sufficiently as Alcohol & Water, Oils in Oils, Metals in Metals &c.

To perform Operations proper Vessels are to be chosen, these are made of White Stone, Porcelane, Glass & Metals.

The most simple method of Solution is by pouring the Menstruum upon the Solvend in an Stone, Glass or Porcelane Vessel, & let them stand till the Solution is perfect Ex: Nitro & Water, but sometimes Agitation is necessary in order to complete the Solution.

Ex: if Water tinged by dissolv'd Cochineal & Alcohol may be gently poured upon it & to occasion no Agitation they will not unite for many days or perhaps not at all, unless shaken. — Agitation therefore the first assistant to Solution.

The next help to Solution is Pulverization, for if the Solvend is in one lump a small portion only of its surface can be apply'd to the Menstruum, but if powder'd a greater quantity is apply'd.

Ex:

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Exple: Nitre when powder'd & shaken in Water more readily dissolves than does when in Crystals. the same happens in dissolv^g Silver in a dilute Nitrous Acid as by Hartis, that in powder more readily dissolv^d than that in ye lump.

To this is owing ye more ready solution of the Calxes of Metals, but whether this happens from their being in powder alone, or perhaps from some of ye Solvents being left is uncertain. as for Exple Minium more readily dissolves in Vinegar than Lead itself, perhaps too it is assisted by a quantity of Acid coll from ye fire as ye Minium gains in weight. or solut^n is assisted by Heat.

Exp^t: Quicksilver is not soluble soon by shak^g in a concentrated Vitriolic Acid, but by ye Heat of Fire, it is soon dissolved.

Nor can we well account for ye encreased power of ye Menstruum from Heat, this not from from ye encreased power of Attraction as Boerhaave believes it; but rather this from ye encreased rapidity tho' this is not certain, but true howsoever it is that the Heat of Fire assist ye Menstrua in dis^g Bodies Some Solutions before they are compleat require to be digested a considerable time, but by being long

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long exposed to heat, part of ye Menstruum will fly off, if ye Vessel should be closed it would break from ye rarefaction of ye Air, but the best method is by putting them into Vessels wth long Necks in wch ye Vapours being condensed will fall back such Vessels are call'd Bolt Heads, Matrass what? In making ye Extr: Cortic; where we are obliged to use Sp: Vini ye most convenient method is to put it into a Phial, wth a long Tube put into it and luted wth Clay & Sand.

Table

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Table of Affinities according to Dr Fordyce

Acids	Acids	Alkaly	Absorb Earth	Metals	Sulphur	Fixed Air	Water, Fixed Alkali, Alcohol, Salts.
Phlogiston	Zink	Nitr Acid	Nitr Acid	Phlogiston	Fixed Alkaly, Earth	Metals	
Fixed Alkaly	Lead or Tin	Nitr Acid	Nitr Acid	Acid.	Zink	Calc Earth	
Calcar Earth	Iron	Acid of Amber	Acid of Amber	Metals	Iron	Alkalies	
Volat Alkaly	Bismuth	Muri Acid	Muri Acid	Muri Acid	Lead	Vol Alkali	
Magnesia	Copper	Vegit ferment Acid	Vegit ferment Acid	Nitr Acid	Mercury	Vol Alkali	
Metals	Reg of Arsenic	Vol Nitr Acid	Vol Nitr Acid	Nitr Acid			
Earth of Alum	Mercury	Sulphur	Fixed Air	Veg Acid			
Camphor, Ether	Silver	Fixed Air	Water				
	Gold or Platina	Oils					

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Lect.re 4 of.

On ye State } Solution is performed by
- Addition
- Agitation
- Divis.n or Calcinat.n of ye Solvend
- Heat &
- Elective Attraction &
- A free access to d^e Air

Heat is employed in
- Digestion
- Decoction
- Infusion
- Digestio Papiniana

Care is to be taken of
- Effervescence
- Heat
- too quick a solut.n
- Acrimes

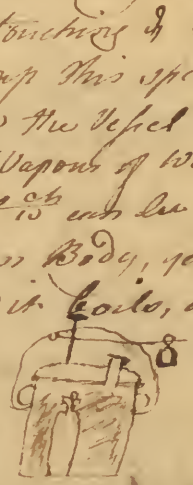
A Compound appears under the form of
- Solution &
- Corrosion.

Yesterday we took a view of ye Manuals, or method of performing the different Operations & in all of them it was necessary they should be fluid but we forgot to mention that heat varied ye proportion between ye Solvend & Solv.t as more Nitre is dissolved by warm than Cold Water, but this is not always ye case as Sea Salt dissolved as well in Cold as Heat. This only happens in d^e manner of Solut.n. The solut.n of quicksilver in ye Nit Acid is here shewn as ment yesterday to be perfect making a Nitrat of & a Turb Mineral.

(a) neither should the Water stand longer than this becomes bad after partly extracting what is Disagreeable, yet avoiding too long may putrifie

Infusion can't always be used, as Hot Water will sometimes coagulate a part of the Solution if Animal Vegetable or Vegetable Substances.

(b) If we could cool Water heated beyond the Boiling Point we might make many Solutions which we can't now do, but tho we can't do this after it has been to boil yet we can communicate more heat to it before it is made to boil, as we see in boiling Water in a Digester and in a heavy Air, for when the Air is heavy and presses upon the surface of the Water it requires a greater degree of heat to make it boil. Many things have been proposed to make this prepare artificially. particularly Papin's Digester made so that its cover comes near touching the top of the Water and the Elastic Vapour arising fills up this space & makes a strong pressure and we can make the Vessel so strong as not to be easily burst by even the Vapours of Water which is the most elastic of any, and Alcohol which can be easily made to boil by the heat of the human Body, yet can by this means be made red hot before it boils, as also many Water. It is made thus



We have spoke of Digestion already we come now to Infusion —

Infusion is when boiling Water is poured upon ye Solvend, as in such an Infus: of Gentian to make a most agreable bitter Stomachic, here the Infusion takes up only ye finer parts leaving ye more desagreable but if Digestion be performed, it extracts that disagreable slyty vapid part wch ye Infusion could not extract, & it becomes a most unwholesome Medicine & very disagreable to ye Stomach, hence ye Necessity of Apothecary's exactly following ye Prescription of ye Physician —

When a Solvend is boil'd in a Menstruum that is called Decoction.

Fluids are only capable of a certain degree of Heat to make them boil, afterwards less can be made no hotter but ye fire passes thro' them without affecting them; however this depends on ye state of the Atmosphere so that Water may be made hence to boil by 99 degrees of Fahrenheits Therm: to otherwise may require 100 degrees of Heat. (6) that Water is easily heated & boils hotter upon to conform to Lan.

Exp: Quicksilver rises in ye Tube in proportion as ye Water grows hotter and is nearer boiling but when the Water once boils the Quicksilver rises no higher, nor will it expand any more, tho' the Water be kept on ye fire ever so long.

Sometimes

1 a Salt Salt saturated wth Vol Alk. & wth added to make
calcinations &c.

(a) Another Assistance to Solution is ye free admission
of ye Air wch always helps, and in some Cases Solution
cant be made without it as in dissolving Copper in the
Vol Alkali if Air is not admitted no Solution takes
place but if ye Air is taken out of ye Phial it dissolves
easily — Hence ye reason of a Precaut^n found A S.

Sometimes a Solvend will not unite wth a Menst^m
tile that Menst^m be united first wth another Solvend to w^ch
it has less Attraction, & then it will unite & precipitate
ye other.

Ex^ple Bismuth will not unite wth ye Vitriolic Acid
but if to a Solution of Silver in ye Nitric Acid, we add the
Bismuth it will immediately unite wth ye Nitric Acid
& precipitate ye Silver. So that some Solutions are
only made by Elective Attraction:

If to a Solution of ye Silver in ye Nitrous Acid
we add ye Muriatic Acid, ye Nitrous is let loose the
Muriatic Silver falling down in a precipitate
Again Copper and ye Muriatic Acid may be
united by ye Copper first being dissolved in the
Nitrous, and will be Pun green whereas before it was
blue; and if evaporated instead of Nitre of Copper
we shall have ye Muriatic Salt of Copper, and this
is ye only way of obtaining this Salt. (a)

This wch has been found lately to stain Marbles
a most beautiful Green colour ——

Care to be taken in performing Operations
of Accidents from too great Fervency, Heat
& Fumes wch arise & are often noxious.

A Number of Bodies contain Lead Air, wch is detached
on Solution, as Reds & ye Lead & Chalk &c.

(a) The Vitriolic Acid & Nitrous mixed but into a Crucible, & a little Oil of Turpentine poured upon them generate such heat wch breaks out in a flame.

To prevent ye Effervescence wch ensues upon adding ye Acid, it is best to use a large Vessel.

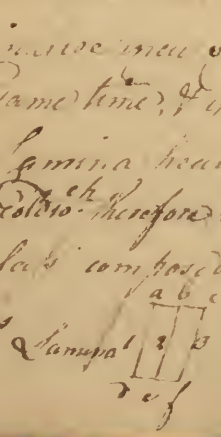
2dly by detaining ye Acid,

3dly by adding the Solvend in small quantities and slow rather than hastily as in dissolving Chalk in ye Strong Acid.

The 4th method is to assist ye Solvend in a state where it has no fixed air, as in the Caustic Alkalies, wch will better in making Effectual Draughts than ye common one. for hereby we avoid leaving ye Essential Oil of ye Vegetable wch flys over, yet Effervescence.

The Generation of Heat is another inconvenience to be avoided, wch often leads to a strong at Bottle (a) in mixing ye Vitriolic Acid, & Lime of Vegetable with Water, the only way of remedying this is by mixing them in small quantities at a time.

The Rationale given why this Glass bear ye Heat better than such ones is from their having been Compressed and therefore each Lamina may be heated at ye same time, & ye reason of such ones breaking is from one Lamina heating & expanding whilst ye other side Cooling therefore not expanding at ye same time. take Glass composed of several Lamina. 3 for instance thus



Sometimes Solution goes on wth too much violence
so as to alter the nature of y^e^ Compound.

Ex: Steel filings & y^e^ Nitrous Acid, for ye Marine
if added together in too great quantity such an Agit^n^
or effervescence is made that all fly over, and ye Acid
will make a Corrosion or Calx of ye Other instead of a
a Solution — on this part Oil has mention'd before, as
a preture on ye Menst^m^ & Solv^d^ to avoid that Inconvenience

Sometimes in a quick Solut^n^ ye Heat dissipates
ye very part of ye product we are solicitous to preserve.

Exp^t^ as in making Ether wth ye Nitrous Acid &
Sp^t^ of Wine, if done in an open Vessel & without care
such an Effervescence will happen as will destroy
ye Ether, & this seems principally to be occasion'd
by ye great Agitation of ye Air Bubbles, but this
may be remedied by close stopping ye Vessel, or by
preture keeping down ye Air Bubbles, wch is done;

1st: By pouring Oil upon ye Menst^m^ & Solvend
immediately upon mixing them. or

First put ye Nitrous Acid into Vessel then Oil &
lastly ye Steel filings wet; to prevent their sticking
to ye Oil. & ye Nitrous Acid will dissolve ye Steel but
slowly, the Oil by its preture hinders ye Air Bubbles
from coming up. In making Ether to prevent
ye Agitat^n^ close ye Vessel wth a Corke, immediately the
Ether will swim at top.

Fumes

Fumes of a noxious quality oftentimes arise, to avoid wch. ye Vessel should be set under a Chimney.

Sometimes ye Fumes are inflammable in wch case it is necessary to ~~take~~ let no Candle come near, Exp: such are ye Fumes wch arise from the Steel filings & Hydrolic Acid, tho' neither ye Acid nor filings are of themselves inflammable. This Exp: was made in a Florence Flask. Comm. Phaedo was wear

Sometimes in a Mech: Solution of a Compound we want to preserve one body & not another wch is combined wth it, perhaps, we therefore chuse a Menstruum that will dissolve ye one & not ye other.

Thus ye agreable Bitter part of Gentian is soluble (by Infusion) in Water or Spt: whilst ye Vapid part is not, again, &c.

Lime Stone & ye Nitrous Acid, ye Acid will unite wth: ye Chalk of ye Stone & leave the Sandy part behind.

Very often our Solutions aren't pure, ye Faces are therefore to be seperated by Filtration thro Paper doubled in a partic. manner call'd Apparatus: sleeve, the Paper should be made of Rags as little broke as possible & should be uniform in its appearance & thin. After Filtration ye Solv: may be obtain'd pure by Precipitation, wch is another Chemic process

A Comp.

A Compound is either Soluble in Water or not
tho' it is called Solution & other Corrosions.

Silver will dissolve in ye Nitrous Acid but is changed
by ye Marine into a Corrosion.

Sometimes a small part will dissolve the alloy
Sub Mineral, this also is Corrosion — but is called
an Imperfect one as a part is soluble —

This is what now mean by Corrosion but it
has been variously applied making confusion. It
being difficult to understand all ye Chym Terms made
use of by ye Ancient Chymists —

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No 8

Lect^re 8th on Precipitation

We have already taken notice of ye first Operation wch takes place in a small Attractive Solution and come now to ye second viz Precip^n

Precipitation is a certain separation of one of ye Elements of a compound by means of adding a third hence always happens by means of an Elective Att^n excepting in a case or two wch we shall give hereafter. Exp^le of Muriatic Acid & Chalk Precip^t by ye Alk^l

Precipit^n depends upon an Elective Attraction in wch occur y^e { Compound, Precipitant, Precipitate

By ye Compound we mean ye substance containing ye two to be separated. By ye Precipitant ye substance we add to perform ye operation. By the Precipitate ye one of ye Elements separated remaining either wth ye Precipitant or falling to ye Bottom. Ex^le of Chalk & Acid &c

Many different things are to be taken notice of in these 3 Bodies and first wth regard to ye Compound It must either be a fluid or a Solid be dissolved otherwise the Precipitation won't go on so easily even tho the Precipitant be fluid.

Exple Nitre of Copper in form of a Salt of Copper may be precipitated by pouring on ye Fixe Alkali in a fluid form, but it goes on slowly and is not so perfect as

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as if ye Salt had been dissolved in Water, on account of ye Crust wch is here formed so as to prevent a further dissolution. but it would be otherwise if Salt had been dissolved

The compound must not only be fluid, or made into a solution, but also considerably diluted wth Water, otherwise ye Precipitate will take up all ye Water, and appear like a Coagulation forming one Concrete as in Precipitating a Saturated Solution of Vol. Alk. in Water by means of Pure Alcohol, as much as possible dephlegmated. This Concrete if not diluted appears a uniform Magma & has been called the Magma Stahlmontianum, NB if Mild Alk. was used and a considerable Agitation is required to make ye Precipitate.

2dly be to ye Precipitant should always be Pure otherwise ye Precipitate will form a Crust over it & prevent its Acting on ye Compound.

Exp^le Nitre of Silver dissolved in Water and Sea Salt added ye Silver begins to be precipitated and fixed upon ye Salt in making a Concretion —

Another thing to be remarked is that we should have ye Solution of ye Precipitant as concentrated as possible because we can then easily see how much is precipitated after ye action of ye Dissolution is over

Exp^le in Nitre of Silver upon adding the Mercury calcined ye Precipitate falls in ye form of a Mass wch makes it neither stay the Acid falls to ye Bottom before we can tell what Effect ye next Addition of ye Precipitant will have wch shows up some time. But if the Mercury is used more concentrated it makes a heavy substance w^ch

as soon falls & we can immediately see whether the fresh added Acid precipitates any more of ye Precipitate.

Care ought also to be taken that ye whole of ye Precipitant be already made use of, but had a proper Effect before we use more, for ye Precipt. sometimes has such a Crust formed round itself as not wholly to exert its effects as we found in the last Experiment ye Acid is dropped gently in it, tho' a yellow Crust wch will be removed by digestion

Care ought to be taken of this, as it often happens that both Precipt & Menstruum are capable of separate ye Precipitate, hence no more of ye Precipt is to be added than just sufficient.

Exp^le Vitriol of Copper precipitated by the Volatile Salt both ye Vitriolic Acid & Volatile Salt being capable of dissolving ye Copper, hence too much Alkali must not be made use of. Hence we may also observe that it is not indifferent wch of ye Alkalies we stand above a Body wch is Table we take to make ye Precipt^n wch from Volatile & Fixed Alkalies are used to Copper. But from precipitating with ye form of Copper ye Fixed Alkali ye form of a Calx or Oxide, hence different Proceedings are to be used as we would precipitate of one form or other

Another thing to be taken care of is

Never to use such a Precipitant as unites wth ye Ground with will form a Compound insoluble in Water, so that when we intend to precipitate any thing from ye Vitriolic Acid we should never.

(a) as when we add ye fixed Alk^l to a union of Nitrous & Vitriolic Acids ye latter is a union of ye Alk^l & Vit^c Acid

(b) also when we want to get ye Nit^c Acid pure from a Combination of it & ye Muriatic we add a Solution of Silver in ye Nitrous Acid & ye Muriatic unites to ye Silver falls to ye Bottom & ye Nitrous is left swimming at ye top pure

never use the Fixed Vegetable but the Vol. Vegetable
Spirit. the Fixed Vegetable making wth the Spirit called
Acid a Vehiculated Salt which is soluble in Water
wth great difficulty, (requiring 20 times its Weight
of it) hence will be liable to fall to the Precipitate
encreasing the Quantity but decreasing as to
the Quality of the Medicine of wch we have an instance
in Mr Pr. Pal. of Lond. Chem. but if the
Fixable Spirit be used it makes the Sal Glauberi
b^th to easily soluble & in a small Quantity of Water.

The Name Precipitate is given to whatever is
separated & appears in a solid form whether it swims
on the top or falls to the Bottom, and may be 3 distinct
things as 1st the Menstruum alone 2dly the Precip^tate
alone (6) 3dly the Menst^m wth addition as when
this separated in a Neutral Salt, & 3dly the solvend
wth addition, as in the Precip^tate of Silver from the Aqua
Fortis by means of the Marine Salt wch unites & falls
wth the Silver.

Along wth the Precipitate we need a new
formed substance called Lac in the Proc^ess of Copper w^th
Alkali. for wch is to be wrung off the Precipitate
this is called Edulcoration, and thus the Precip^tate
is now performed completely.

But there are other 3 Precip^tations no sooner it is
done, the 1st we can account for easily but the
other two not at all.

The 1st wch is the combining the Nitre of Silver
& the Mercury of Gold (or the Acid & Gold) the Silver

attract

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Attracting ye Muriatic Acid stronger than the Gold does, leaves ye Gold free wch having no Attractn to ye Nitr Acid falls to ye Bottom & ye Nitr Acid swims at ye top. whilst both Gold & Silver are precipitated ye Gold in Powder & ye Silver joind wth ye Muriatic Acid.

The 2d is ye Precipitation of ye Salt of Gold from Water by means of Æther. The Æther first attracts ye Salt from ye Wr and afterwards upon standing attracts the Acid from ye Salt and ye Gold falls to ye Bottom. Æther has not this effect upon any other Metallic Salt but ye of Gold hence we can purify Gold by this means. wch we can't account for.

The last is also very unaccountable & seems to destroy ye whole Doctrine of Attractions. It is this.

Water wch has not Attraction for a Metal will precipitate it from an Acid wch has so great an Attn to it.

Exp: Muriatic Salt of Antimony dropd into a Glass of Water. Nitre of Bismuth & Antimony & Nitre in ye Vitriolated Ale ye same. —

Lect 10

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Sect: 4 of Fermentation

By Fermentation we mean such an assimulating process, as by an intestine motion changes one substance into another differing in its properties. and in order that Fermentation may take place it is necessary that the substance should be fluid or at least moistened if solid.

It sometimes happens that if we set a substance in certain circumstances as to air Heat Moisture &c a ferm^n will take place. as Barley will be fermented by an intestine motion into a substance different from what it was before - also The Juice of the Grape thrown into a working Vat. & exposed to a certain degree of Heat, from a mild substance will be changed into a pungent one capable of Inebriating and Intoxicate.

It happens sometimes that in order to begin this it is necessary to add a substance already undergoing the same process. As an infusion of Malt alone will only become Musty &c but if Lees of Wine & Flowers of Wine or of Beer called Yeast be added it will set the ferm^n a going. In this it differs from Solution for in this two substances are set together in order to make a compound, but in this we use only one either to out addition or when to addition two of unequal Quantities one very large & other very small and yeast to changes large Quantity into its own Nature.

Fermentation there is of two sorts 1 one whereby Ebriation is begun by putting the substance in a proper Circumstances, 4

the other where a substance is added already undergoing the same operation.

We endeavoured to shew in the first Lectures that no Operation took place without Combination or Separation & in form" both these are evident.

In some Fermentations (Vinous) the Acid & Bitter changed into Alcohol, as we can demonstrate by making Alcohol but combining these two Principles, and there is always an Acid formed before or wth the Sugar is analysed & Bitter Sugar into Alcohol. — If we were as well acquainted wth the Circumstances of other Fermentations we might also demonstrate a Combination takes place in them. There is also always a Separation and Elements must first be separated before there can be a Combination.

There is also a Separation of one or other of the Elements forming whole Gases in many Form^ns as Fixable Air wch we see arises in bubbles. also in other Form^ns there is not only something separated, but also something acquired probably from the Air as there is generally an increase in the Weight. and after the Fixed Air is separated it again when it comes into proper circumstances attracts more Fixable Air from the Atmosphere.

The Separation of the Air wch arises thus in Bubbles is called Effervescence wch has been confounded with Fermen^n but thus differs widely it first taking place in most Solutions but hardly ever in form" & is a Natural Process changing the solid substance into another differing from what it was before, and tho Effervescence does sometimes happen in form^n yet it is by no means essential, as

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no Ferm^n may take place without it as we see in ye making of Bile and Liver, as no Air can here be separated.

The not properly distinguishing these has occasioned much Confusion, for Van Helmont proved almost undeniable that of Bile is made by a fermentation but other Mechanical Philosophers contradicted this saying no effervescence can happen in ye Liver & hence according to their opinions no fermentation, but it certainly may as there may be compounds fermented without having Air separated, or there may be such as attract ye Air & destroy it as soon as it is loose from ye others.

Fermentations then are not artificial but natural Processes & Bodies may be always changed by them if exposed to proper Circumstances.

We can't excite Vin: Ferm^n in any Substances not cont^g Sugar, consequently Animal & Vegetable Substances are ye only ones fit for it. Minerals not being capable o'it. Particular Ferm^ns take place only in particular subjects, as we see in both Animal & Vegetable Substances.

ye term Fermentation has been formerly confined to a certain number of Processes. But by our Method ~~in it~~ we comprehend all such processes as are similar to our Definition wch is this.

Fermentation is an assimilating Process by wch a Substance is converted into another diff^t from what it was before.

Boerhaave confined Ferm^n to 2 only viz ye Changing Sugar into Wine & Wine into Vinegar.

Stahl

No 4 The Stable made up into 4 Saccharine Vinous Acetous & Putrefactive. but Dr Cullen first extended it to ye term we now use it comprehending all changes of one Body into another without addition.

We shall 1st take notice of Stable State of Bodies

The Saccharine 1st is that by wh Animal & Vegetable Juices, & farinaceous parts of Seeds are changed into Sugar.

The Vinous is that whereby Sugar is changed into Alcohol

The Acetous is that by wh ye Alcohol is changed to Vinegar.

The Putrefactive is ye conversion of this Acid into a Gelatinous Substance, then this Acid is changed into Volatile Nitrous Acid & Calcareous Earth.

The Saccharine is ye only one of ye 4 wh is denied by Chemists who said that Sugar was made Mechanically by Tubes of ye Plants, but we show that it is a Fermn & is made by an intestine Motion within ye Plant &c

1st Fruits are often changed into Sugar pointing Austerely Acid, all Fruits being at first Acid but afterward become Sweet. If this happen'd only wherein ye Tree it might be alledged that it was by the Juices being changed as sweet one taking up ye place of ye Acid, but if we take ye fruit while Acid lay them in a Heap in a certain Heat they change their Acidity into Sweetness and Sugar may be got.

2dly The Farinaceous parts of ye Seeds of Plants are changed by Fermn into Sugar and this by ye steeping in Water, then

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then throwing 'em into a heap, where they begin to grow very soon so ye Bud begins to shoot. ye whole of ye Juice is changed into Sugar. and this is only by adding Water to make it fluid. Thirdly as we have already said being necessary for them as much as Solution &c. The same thing happens to farinaceous Roots, wch perfectly resemble Seed in this.

Sugar by ye Eye seems to be absolutely necessary for ye growth of Plants, and is always found in ye Plant when shooting, Blood in Princes &c. it is found when ye Birds come out — When ye Seed is impregnated a considerable quantity of Sugar is found in ye Allantoid in order perhaps to nourish & tender young Seed, it is also found about ye flowers at this time, and betweene ye Sugar is & when ye Seed is ripening & then it again begins to bleed forth.

The Venous & Arterious have always been allowed to be Fermentations.

The Putrefaction is evidently a form^n being a conversion of Animal & Vegetable Substances into a uniform substance or Jelly. & this again into Vol Alkali, Mid Acid & Fixt Earth — all Anim^l & Vegetable Substances put in proper Circumstances & made fluid have this taking place. It is not generally however taken notice of that this consists of two Stages, 1st when y^e

2^d when ye whole of ye Anim^l & Vegetable Substance is changed into a Jelly or thick Substance as

as a Bladder thrown into Water turns to this Jelly first before it can be converted into Vol Alkali Nitr Red Calc Earth. Bones Horns & other Anim Subst-ances all do the same. This Substance dried is called Glue and differs a little in its stick, equally according as made from diff substances. from of Bones of Fish this called Ichthyocolla — Hence if Ferm answers to our Definition, convert if whole of d Substance into Glue uniform mass

The Second Stage is when this Glue is con-verted into yet other different substances. I saw converted for we can't show of 3 in Glue, tho' they may indeed be got from it by another Operation tho don't change but extricate d Elements. viz. Chemical Analysis. this is then if last stage.

These 4 Ferm.ns take place in vegetable as well as Animal Kingdom but are not done in every tam place in vegetable, for another ch takes place in if Smutt ch is a conversion of all the Seed into a Black Powder. & this happens by a quantity being added by coac of Fermentt, it not being capable of being begun but by this means Hence by grafting into a fruit tree shall infect all of Grain in ch course it V & Corn would appear ch more Black Heads. this also answers to our Definition of Ferm there are also more in if Vegs Kingd.ms

We shall next see if these 4 Ferm.ns don't take place in Animal Genus.

and 1st

1st The conversion of Vegetable Substances into Animal Juices or if added into Blood is evidently done by a Ferm.n We take a Vegetable Substance into the Stomach it is there dissolved in Liquor Gastricus and the Farinaceous part of the Vegetable Seed was in Water in order to qualify it for undergoing Ferm.n They then begin to have an intestine motion, like let loose a-gain many Ferm.ns: and tho at first of quite a different nature are now converted into Blood, and that without any addition except of the Juices they are to be converted into & this by way of Ferment. This is similar to the Saccharine Ferm.n in Vegetables.

There is something happens here analagous to the Acute of Lep. Ferm.n 1st an Acid is made in the Stomach before the Saccharine Ferm.n takes place and this Acid has its properties changed afterwards by mixing in the Bile. After this Saccharine Ferm.n which matures into Chyle & next is into Serum of the Blood much resembling the 1st Stage of the Putrefactive Ferm.n. It is doubtful whether the Acid found in the Stomach be similar to the Acetous Ferm.n or the Serum to the Gelatinous parts of the Putrid Ferm.n. It cannot then prove whether the Acid is similar to Vinegar, or is not different. but we know that the Animal Juices have ~~a different~~ for the Gelatinous Substance formed by Putrefa.n

One evident difference is this All Animal Juices are coagulable by Heat as the Serum, & also by the Acids or an Acid, but this doesn't take place in the Jelly formed by Putrefa.n it is not coagulable

Anim.

Animal Juices however certainly are capable of a putrid Ferm.n in y.e Body, and this is evident as they are thrown out into y.e Bladder nearly in a Putrid state likewise y.e product of y.e Putrid Ferm.n is always found in y.e Body in different parts, as y.e Amm.a Salt and Blood consists of Vol Alk. &c. but y.e Putrid Ferm.n in y.e out of y.e Body do differ in produc.g y.e Acid of Vitre & phosphorus Vol Alk. fixe Salt.

Another Ferm.n in y.e Animal Kingdom is y.e change of y.e Blood into Bile. It was y.e opinion of Van Helmont & y.e Ancient Chemists that all secretions were owing to such Fermentation, but it was laid aside by their confounding Ferm.n to Effervescence.

But all Secretions are not Ferm.ns as when we find y.e substances seperated similar to parts in y.e Blood, & these are only Seperations as we see in y.e Urine Mucus &c. Mucus being similar to Serum of y.e Blood, and a part is so similar to y.e Urine, as y.e Water containing y.e Putrid parts and Amoniacal Salts Vol Alkali & y.e Acid of Phosphorus The Saliva is similar to y.e Serum as well as the Mucus, & ran to be secreted into follicules and afterwards y.e thinner parts taken up in y.e Mucus once but partly left in the Saliva &c. if run off immediately upon secretion seems to be Serum exactly.

But y.e Bile differs from any substance found in y.e Blood, it is a Mechanical Compound consisting of y.e Principles, Red Globules, Coagulable Lymph,

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Serum, & Water containing the Salts which is afterwards to be separated by the Bidneys, certainly none of these principles perfectly resemble Bile nor is it contained in the Blood.

Part of the Blood is separated in the Liver, probably the red Globules, it is probable that the Water & parts transude thro' the Mesenteric Vessels & the Blood goes thicker to the Liver & the more red Globules in proportion this is thrown into Follicules and these undergoes this fermentation from thence is carried to the Gall Bladder & there has the fermentation completed. This is similar to all true fermentations, & it is difficult to say why ferment^n takes place, it is a natural Process we can't account for, neither more than we can for Sugar's being changed into Wine or the Juices of Vegetables into Vinegar.

These fermentations happen in the Body in its natural state; besides these there is a Number of Diseases introduced by a similar ferment^n as the Plague, Small Pox, & Lues Venerea in these three it is probable the Juices undergo a ferm^n from a small quantity of Liquor taken into the Body, by this the Juices are converted into a Mass similar to that small quantity of Liquor, as in the Plague & Small Pox the Blood is changed into the Nature of the Miasmata & this Blood will act upon another Body, as the Miasmata would do viz as a ferment.

In the Small Pox this is proved, as by introducing a small quantity of Matter into the Arm the Juices are converted into this same nature & a part is thrown out in Pustules. — The Juices

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The Lues Venerea is also communicated thro' by a small quantity of Infected Juices wch ferments changing the other into its own Nature.

The Symptoms however are by no means to be recognized from any circumstances of these Fermentations wch only serve to introduce the Disease wch produces these Effects.

Some of these as the Plague, the Small Pox never recur, as Sugar once changed into Wine can never again undergo the Vinous Ferm.n so it is with the Juices of the Body in these two Diseases. but the Lues Venerea will often return, because only a part of the Juices have undergone the Ferm.n those parts barely being capable of the Disease wch are exposed to the Air, and when the Disease is cured by throwing out the Infected Juices, yet the Juices wch is afterwards secreted may be as liable to the Infection as first was.

No Ferm.n ever takes place in the Mineral Kingdom all Substances found in the Bowels of the Earth being constant & permanent. so as not to be converted into different substances without an evident addition or Seperation. Indeed Ferm.ns have often been sought after in these, but after they have been worse much tortured, the addition of Phlogiston alone has soon restored the Metal to its natural form.

As to the Manœuvre or management of Ferm.n this differs in the small, the Sacch.ne requiring one the Vinous a different management. We

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we can only treat of these when we come to ye particular fermentations. In general it depends upon putting them into proper circumstances, one of wch is common to a number of them is ye free admission of Air especially in ye beginning — Hence we may perhaps account for one use of Lungs viz to bring ye Air to ye Blood in order to assist it in ye fermn into Red Globules, wch therefore most abound where the Respiration is free.

Another thing is the Lues Venerea never breaks out but in places exposed to ye Air, except in very bad confirmd Cases. & it generally happens that ye Infected Matter is attracted into ye Blood & then secreted into ye Mucous Glands where it lies ye fresh Air admitted to it & then begins the fermentation —

In Venereal Bubos & in Porrilenum it affects where not exposed to ye Air, but this seems to ye occasioned by ye Cold, wch seems to have considerable effect on this fermentation as well as ye free access of Air —

Gonorrhœa

N.10.

Lect. 4 10th on Chrystallization

We have now gone thro' three of the Operations on Bodies fluid in a small heat & come now to last, viz. Chr.

Chrystallization is a regular form in Bodies taken on in becoming solid. As Nitre, & Sea salt.

This Operation has been supposed to be peculiar to some Bodies only as Salts. hence Linnaeus has ranked all Chrys. alleged Substances together. as Diamond w. Nitre & called Chrystallized Earth Salts — But Chrystn. is not peculiar to saline substances, but takes place in almost all Substances, as we see in most of the 5 principles of Bodies and many of the Compounds.

not peul. to Saline Sb.

1st In the Saline it evidently takes place in Nitre, Borax, & Acids as in Borax, Nitre & Alkalies. Vegetable Alkali chrystallized by pouring Alcohol upon it. In the Inflam. Substances as in the Earths & Bitumens Chrystallized on Sperm Cetti, in Sulphur also as shewn chrystallized in the middle. In almost all the Metals & Semimetals in becoming solid, as in Bismuth &c.

Amongst the Earths we have Chrystalline Earth & Clay Earth. French Chalk also Chrystallizes. Water also in freezing forms a Sort of Vegetation, on its surface, or against the sides of Houses.

In the Compounds Sulphur & Lead united into Lead ore, Arsenic in the ore is Tin, are each in Chrystn.

Aerial Substances can't indeed be Chrys. alleged as never found but in Vapour unless when combined w. other substances. Hence Chr. has no means confined to one Class of Bodies —

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Chrystallization has also been called Chemical Vegetation. The Arbor Diana or precipitation of Silver from the Aqua Fortis by means of Mercury is very fine & resembles a ramification or a tree; Another wch has been called Vegetation is a chrystallizn of Iron upon Clear & some times of other Natural substances in many of wch there is the appearance of beautiful Lapidescences.

The Fixed Vegetable Alkali also upon Chrystallizn by means of Alcohol poured upon it has ye appearance of a beautiful Shrub without leaves the Alcohol makes it Crystallize by preventing its attract of moisture.

This Irregular formation of their figure on becoming solid happens either in their becomings so from a Fluidity, Vapour or in their precipitation or seperation from their Menstrua.

From a Fluidity as in Sulphur melted & poured into Paper made in form of Hyperbolick Sleeve.

From ye State of Vapour as in Cinnabar of Antimony being changed into Vapour by Sublimation also in ye Sublimn of ye Vol Alkali wch is often got Chrystallized.

From a solution in a Menstruum as in Silver upon ye cooling of ye Water Chrystallizes ——

Some Bodies on Chrystallizn always affect ye same figure, others different figures.

Sepia Vitre always affects ye same drawing 6 sides & six Angles wch ye same end and form.

Others assume different forms as Chrystalline Earth in many different figures as

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topaz, Pure Crystal, Pure Earth, & of Scotch Pebbles or Granite stone & many more.

All Earths & other Substances assume different forms some Salts assume forms apparently different, such if broke down to their constituent Crystals are found to be of same, as Saltpetre always is always Cubical yet seems to follow of form of hollow Pyramids is however if broke down are found to consist of small Cubes joined at ye end & forming stone and fresh Cubes are added so as to make hollow Pys.

Also we see of some sort of Salts shoots & large into different figures as Parallelopipeds.

Different figures are also verifiable place in ye combinations of ye Metals lead & alcali Earth again Gypsum, Asbestos.

One Thing may be remarked in all Substances affecting to assume the same form, they are of same on their sides, but differing their Proportions or Parallels of their sides, some sides being large others small consequently some Crystals flat others nearly Cylindrical form.

It has been a favorite Theory amongst the Ancients especially ye Pythagoreans that Smell & Taste of bodies were similar to the Crystals. They said that ye Principles of Nitre were of very regular figure as Crystals, but this implying we were could scarcely make them to analogize the Nitrous figure. A Cube indeed might be united thus ⊞ into one large Cube but this not so ye Nitre besides this evident upon looking at ye Crystals that they are made up of plates

(a) Tho' this Regular way of Chrystallizing Bodies may change the Direction of their Figure also from becoming suddenly cold. As Nitre cooling too suddenly, shoots every white from the Metal. & is not so regular in its Crystalls, and Antimony tho' it shoots perpendicular to the Horizon yet from become cool on a sudden changes its Direction from the Circumference to the Center —

& we can break off ye outer Lamina without destroying the figure.

Some Crystallizations not only differ from ye other in particular forms but likewise as arising fr different Angles. As Vitre affects to arise at a particular Angle to ye horizon. Others there are yt arise at a particular Angle from one another, as in Snow & Water crystallized whose Crystals affect to rise at Angles of 60 degrees from each other. So that a particle of Snow Crystallized lies ✱. Another Ice Lame is of a Dimensione yt Crystallizes at right Angles, being double Pyramids & yt have a Cube the appearance. The Crystals are also fixed to each other at right Angles.

The most general thing in Crystallization is that Crystals Flowers begin to appear in ye middle of ye Liquor or above, but at the Sides or Bottom where they may touch some Rest or at the top where ye Air is admitted as in ~~[illegible]~~ or Crystals. Hence different Substances have different parts of the Liquor where they Crystallize, and that at ye top, Vitre and Bottom Glauber Salt at ye sides, and Salt Crystals arising from large ones do if once appear sideways or downwards (a)

The Angles at wch Crystals arise & their form is generally permanent yet we can alter ye form of ye Crystals from wch they arise & by applying Cold & Heat to ye different parts of ye Liquor will begin there.

Tho this Operation is a Natural one, we can also perform it artificially, by putting a Body into ye Circumstances proper for it.

Ice

(a) Hence the impropriety of adding Distilled Spirit. Waters to Solutions of Salts. As Chl. Sil. dissolved precipitates ~~Crystals~~ Prussian Blue.

It is performed in order to obtain Salts from Waters in their solid form.

Salts are got from their Menstrua by Crystallization 3 different ways — 1st By drawing off the Water in Vapour as in the Salts and Salt is found Crystallized at the top as the Water is wasting off.

2dly By cooling the Menstrum containing the Salt as Water will dissolve a greater quantity of any substance when hot than when cold as notice in Nitre we have nothing to do but let it cool & when the Heat is equally applied to each side of the Vessel it Crystals always arise from the Bottom.

The Last Method is by Means of Precipitation as Salts may be crystallized if precipitated from their Menstrum or Water in wh they were dissolved. Thus a solution of Nitre or any other Salt in Water upon adding Alcohol is precipitated (a) the Alcohol attracting the Water more than the Salt does & is precipitating Crystallized into small Cubes.

There is this Peculiarity in Chy that you cannot get the Salts pure, tho many Salts were dissolved in the Water at the same time, if Crystals of one have no attraction those of the other. For Sal Digest Sylvii & Nitre are both in the same Water & Crystals should differently & may be picked out from one another being easily known by the one being long & the other Cubical. This one way of separating Salts by Crystals.

Another way is in regard to the different Circumstances of their Solubility in Water. Some being only soluble in Hot & others in Cold Water, hence those are dissolved only in Hot Water, will

(a) Hence it would seem that as we generally know ye quantity of Salt we have to expect & consequently ye Degree in wch this soluble; that, making a Mash upon our Vessel in wch ye Exper^n is performed to what length we are to continue ye Operation would be ye less fallacious of any Better than in the Observing of ye Pellicle &c —

will be separated when the Water becomes cold.

Rad. Sedative Salt & Cubic Nitre & Selenites not being soluble in cold Water will on cooling fall to the bottom.

Marsh Salt & Sal Glauberi are hereafter.

Another way this, tho' both are soluble in warm & cold Water, yet if one is soluble in a less quantity than the other & thus. Nitre is dissolved in twice its weight of Water. We need only evaporate $\frac{14}{20}$ of the Water & the Vitriolated Tartar will fall to the bottom & we shall get pure Nitre, in this way remaining Water together with a small Quantity viz $\frac{6}{320}$ of the Vitriolated Tartar.

Another Method is regard to Solubility, that one is soluble in a greater proportion of hot Water than of cold, as Nitre & Salpeter. Others are equally dissolved in Cold & Hot Water as Sea Salt. if the Water is permitted to cool the Nitre will Crystallize but the Sea Salt remain dissolved.

We shall next take notice of a few Cautions necessary to be observed in the Operation.

1st. The Heat should be applied gradual for fear of calcining the Salt which will happen if the Heat be too great as the Nitrol of Down if too great heat is applied for Sal Gemm is found calcined into an Ashe.

The Evaporation therefore should be as gentle as possible and we should for this purpose have a free Current of Air & in order to have the Crystals perfect we should let the Evaporation be performed by the Heat of the Air alone in a Summer, & the Soap must not be performed too long otherwise we shall have the Salt in a dry Powder. (a)

There

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There is one way to get the Crystalls pure from dirt & mucus. That is by mixing Quick Lime to the Vat should only to such as have a clear & Shaley & not metalline Salts to be found recomposed but in Borax it is proper for Spermat Salts as Sugar to be long boiled in Lime Water or Quick Lime itself has to sit & mucus destroyed. afterwards the Crystals are sold upon Twig or Sticks remain in order to be free of remaining part of the mucus adhered. Hence the Sugar Boilers do this to attain the Malaxe.

In order to have the Crystalls large it is necessary to have a great quantity of Solution at once. and this is the reason why Nitre is so large Crystalls from the East Indies And in Borax the Dutch have gained credit by making too fine & large crystals owing to their making it in great quantities, boiling time which Fletching is to be exported in the heat and air of their Laboratories.

The last thing to be remarked is that if the Crystals are perfect they generally contain a considerable quantity of Water. As we see if we pour a little dr. of Saltpetre into Water Water & the water not in too great quantity will be all taken up into the Crystalls & the whole remain a solid Crystal this is called Coagulation. And what remarkable in this Experiment that if stand quiet it will not Crystallize but shoot a little of Crystalls begin to shoot immediately. & this is the last Caution to be taken in order of Crystallization.

Having now done with the Operations in small we come next to treat of those magnificent degree of heat but first of all a knowledge of Apparatus is necessary for this in our next

Lect. II.

(a) It is not very certain that friction is generally heat we say it is only between two hard bodies, yet however we shall prove hereafter, as no fluid but water against a solid can produce heat, there is none produced but in friction of water against Canals and streets tho' it run ever so rapidly nor do the highest Cataracts ever produce any tho of water, also in our such jets against of bottom were indeed off colder than at the top & for a very good reason viz the great evaporation is a sufficient generating a great degree of Cold —

Lect.re 15th — Of Raising Heat & Applying it.

Heat is raised by
- Friction
- Solution
- Fermentation
- Animal Power
- Rays of Light collected by a Lens or a Burning Glass

Fuel burns by application of
- Air
- Steam of Water.

Air is applied by
- the Bellows
- Chimney
- &c.

We come now to the Operations which require a great Heat at least considerably above that of our Atmosphere, to make some of the Particles need fluid.

These Operations consist in raising, and applying the Heat. The Apparatus necessary are those which are generally called Furnaces.

Heat we have said may be excited different ways

1st. Friction, for by rubbing two hard Bodies together a considerable degree of heat is generated, indeed the greatest Heat can be this way raised, rub a white Flint against Steel & Heat is obtained being so violently by the great heat, & is forced off in Sparks, but this sort of Heat is not proper for Chemical purposes as it cannot be properly applied to the Bodies, besides it is not be equable. (a)

2d is Solution under which we may properly place Fermentation also, as no Fermentation can take place but in consequence of a Solution, but neither of these are proper for our Operations, and

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and tho' by Fermentation a very equable Heat is kept
that be applicable to our Operations yet not much used
It is the Saccharine Vinous Ferm.n w.ch excite Heat the
Acetous does very little & Putrefactive none at all
Fermentation is applied in an closed Dung w.ch containing
Seeds & farinaceous parts of Plants & Vegetable Substances
as Straw w.ch having gone only thro' Saccharine Ferm.n
in the Bodys of Animals the Fermen. takes place in the
Dung & continues tho' the Acetous has begun, but
as soon as the first Ferm.n is over Bottle or no heat
is excited by the Acetous & Putrefactive none the
Dung is indeed hot at times when part of it is undergoing
Acetous & Putrid but then it is owing to some other parts
of it is going thro' Saccharine or Vinous.
It is employed in France, & in the great Works in
Holland for making Sedgegrass, and in Botany &
Gardening to raise Artificial Heats in the Climates
The 3 Method is by means of Animal Power
w.ch of Body considered as a Living Body excites to a considerable degree this very equable generally abt 96 degrees
of Farenh.t Therm.r and no Animal varies above 2 or 3
degrees from that same time whether in Winter or in Summer
for in Winter when the Atmosphere is cold the Body is about
that standard, & in the hottest Summer & in the hottest Climate
varies little or nothing so that an Animal Body in such
a season may be said to generate Cold, but of this hereafter
when we come to treat of Refrigeration. It is not used
in our Chem.l Operations we be used daily in Natural
ones, as.

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lies in sitting on her Eggs, a provision of Nature
and in this the Natural affection of Animals toward
their young is very remarkable many sitting a long
time without taking any food, for if they should leave
their charge at any time for a sufficient time to feed the
Heat be extend to such degree it would be fatal to their
young.

The last is the Action of Fire upon the
Fuel which is most noted in our Operations. but
we shan't enter into the Theory at present only so
far as is requisite to enable us to understand the
management of Furnaces.

Fuel applied to any place considerably hot
gets heat retains it & propagates it. Fuel applied to
an hot body emits Vapours in touching of her
inflame, and indeed the Burning of Fuel depends
entirely upon of Air and Fire cant inflame a
Body in Vacuo tho' of Vapour would be raised but it
not be capable of taking fire and burn over Air after
it has once served for Burning Fuel is incapable
of it a second time. Hence if we should have a Stand
grate and Chimney of a Furnace & let no Air pass to
it but what serves to feed of first fire & serve its purpose
of second it not burn. Hence the free admission
of fresh Air is necessary, and we may add that
Fuel burns in proportion to the quantity of Air
applied to it in a given time, & 6 ounce of Fuel
put into a Furnace, and a Square Inch of Air be allowed
to get to it & this only touches a quarter of an ounce of
Fuel, so

so much heat would be generated than if there were only sufficient of fuel in the furnace, and if the diameter of the furnace [illegible] fuel will be set on fire & so much heat depends upon the quantity of fuel then burning.

Fuel then only burns in consequence of the application of different parts of fresh air, and the strong or weak blast the more fuel will be inflamed & the greater heat excited but one thing to be taken notice of, viz. that it is not the air only that is requisite to raise heat to make fuel burn, the vapour of water serves as well, and if a considerable stream is applied it equally other method.

Now the different methods by which we apply air or water to fuel in order to excite different heats are of 3 different sorts. 1st Bellows for the application of a stream of water, 2d the Bellows for a strong blast 3d the Chimney for a strong draught of air. We shall now speak of them more particularly.

1st Fuel will burn if left in the open air without any apparatus more being necessary for its application. But little flames shine and flare about, for though something is applied to move it, as if water in a lake is forced by the wind can't possibly be moved that of some river without and water without some force applied.

The same takes place in fire air and if a fire when we lighted did not excite some motion and air no fresh air could be applied it would go out. but the air being heated is rarefied becoming lighter in proportion and is buoyed up by the cold air is comes rushing to the fire & the same

Ca 1 Algo however not so convenient for Dice Operations
as Head occurrences is not equable.

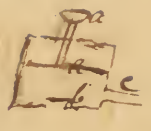
the same way as if we pour Water upon it, & it will rise to the top. In this way a fire may be kept burning but a very large stream of Air is not applied at once, hence it burns slowly, & the fuel lasts on fire a long time. We therefore use diff^t Machines to increase & regulate kindling more fuel at a time by the application of Air as a stream of Water.

The 1st Machine for this purpose is the Eolipile made thus B. A represents the Grate wch fire, B & Eolipile upon it (C) & flames arising from fire within grate (D) & Water half pour'd into Eolipile (E) steams arising from it concentrated by & bended tube F.F. to the Grate where they are thrown against fuel. This is principally used in Kitchens.

The 2^d is contrived a way to impell a considerable quantity of Air against the fuel & is called the Bellows, and this method has several advantages, 1st We can excite very great with this other apparatus, so that it's an instrument very necessary for a private Chamber. Another use is that when we want a great heat & operation is to be short & we want to save fuel this is very good & we can excite & regulate heat. It's also used in large Works where they could not raise a sufficient heat without them, again & transport it where they smelt (a)

Various sorts & Machines invented for this purpose particularly & Double Bellows made of 3 Wooden sides (b) one handle fixed in the one side one wch being pulled up & let down in the, Valves thro' blown,

and


a
b
c


a
b
c
d

and from thence a pipe goes thro' another Valve in ye Second side in ye new hoop'd handle to ye place or Chamber between that & ye upper side & is a reservoir. The whole is fixed upon a proper stand.

Instead of this in ye large way we often use two Cylinders & work the Piston. as represent ye Piston moving up & down (b) a Valve where ye air is admitted at the bottom & forced out at (c) by ye falling of ye Piston.

Another and a very convenient way is by ye Steam of Water used in France. There a represents ye stream conveyd into ye Machine & run out at b. Water falling in half way to (c) ye steam from that arising & going out at ye top d.

Another is ye Blow Pipe made generally of Brass & applied to ye Mouth has air blown thro' against the flame a Candle &c. in defaulting ye Body to be melted & inflam'd the whole till grown Brass a unform blue colour. It is generally used for soldering, Enameling small things, blending Glass, blowing up small Glass Bubbles, sealing Bottles Hermetically, Trying Metals by quantities of Charcoal &c. & Spirits & old Things in Vulcan's Laid the Metal pure. It is sometimes fixed into a pair of bellows under to have a more plain blast. A person accustomed to blow thro' this can make a constant blast, his Velum Pendulum Palatinum being a Valve & he then can breath thro' his cheeks are distended.

The least Method and ye least understood till lately is the method of Chymists impelled a considerable quantity of air, and


C
B

as in ye Common Waterlevelers and this depends upon ye laws of Gravitation in fluids.

Laws in Hydrostatics

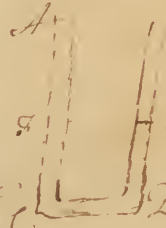
All Homogeneous fluids gravitate about to their Perpendicular height and [illegible]

All Heterogeneous according to their height and specific Gravity together

For Example

Let the large part of ye Tube be filled up with Water to (a) it will rise to exactly ye same height in ye small end (b) tho' there is quantity yet being ye same in Perpendicular altitude will keep ye other large part at ye same height tho' it contain'd the whole Sea, but if the large part has Oil poured into it it makes a fluid than Heterogeneous ye Oil being specifically lighter will rise to (c) & ye Water at a (b) remained ye same height.

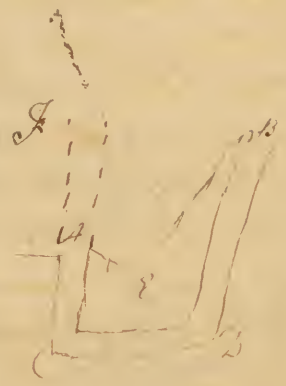
Upon this principle depends the Actions of the Chimney entirely thus



Let B D represent a Chimney to a Column of Air and A C, a Column of equal height in ye Atmosphere, ye pressure in both being equal they will gravitate accordingly equal but the Oil washes the Water. — B let ye fire put in for ex. D and a orifice in ye top D stop it within pressed upward by the heavier air, so

And supposing these two Columns were long enough to reach to ye Oil Atmosphere the most rarefied upper place & have to be a great Carrant of fresh Air. But as this is impossible to suppose

the


F
A
B
E
C
D

the Chimney to go no further than B and it of dotted Column or present of Coldemin opt) & mean time the Air will rarefie a Column ranged to B and Chimney B this will anch it in proportion than between B & (with other Column, so that it hidrepelles good and Hence we may see that of Cause of Chimney a good and (to of top of Atmosphere) the Mean of Drawers of Air.

From the same Theory, if Circulation of Air in a Mine may be accounted for. — If Mines are generally about Mountains or at least where of Ground is higher at some Parts than at others, they make one Shaft in the higher ground as from B to D, and another in of lower as from A to C; — The Air being hotter above than it is in the Mine in Summer, The Column B.A.C. equal in height to B D will be lightest, & then acts powerfully upon it from B to A. consequently the Column B D being of greater Weight will buoy it up & such a Current will run from B to A in Summer —

But in Winter the Air is hotter in the Mine than above ground hence of long Column in of Mountain from D to B will be more rare than C A equally [illegible] A B more dense by being acted upon by of Cold externally hence the Circulation will go from A to B contrary to what is D.D in Summer and the Shaft B will now be open & so it happens upon any variation of Weather, one Shaft is open one part of Day & of other another.

Letter 12

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Sect.n 4 12: On the Method of Applyg Heat.

We come now to shew how the Heat when raised is to be applied to ye Bodies to be workd upon.

A Furnace is a Machine ded to ye raise and apply Heat. it consists of 4 parts.

vis a { Chimney
Fire place
Ash hole
Laboratory }

The Fire place contains the Fire; The Chimney takes off ~~takes~~ the smoke, the air abroad passes thro ye Fire and also serves to make a sufficient draft of fresh air to excite greater heat.

The Ash hole permits the refuse of ye Fire to fall into it, retains it & lets the Air get to ye Fire.

The Laboratory is ye part where we place the Metal to be worked upon. These actually exist in a Furnace, are distinct in their nature, tho' sometimes confounded together in the Machine for Imple sometimes ye Laboratory is in ye middle of ye Fire as in the Melting Furnace sometimes in ye Ash hole as in Distilling Furnaces sometimes in the Chimney as in ye Calcinatory. Sometimes ye Ash hole is in ye Chimney.

One thing ch has obstructed the Construct.n of Furnaces is the Confounding these; his making people think that most of them were not essentially necessary to a Furnace but they must exist tho' ye Laboratory maybe in ye middle of ye Fire, yet we must not say [illegible] no Laboratory.

These are

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Art. 121 There are some parts absolutely requisite in every Furnace, and in some particular Furnaces some parts more particularly requisite, as a Chimney is requisite in all, yet in some a longer is requisite than in others particularly in a Melt Furnace where great heat is necessary.

We shall treat of such parts as are absolutely requisite to all & then of those only requisite in particular.

& Here may remark that it is a place where of Laboratory is that in which of distillation by an em-

The first Requisite is that of Chimney be large enough to let off all rarefied & all in smoke if it is not large enough it smoke will return & put out fire be too little this is to be avoided hence least heat.

If the Chimney is too large it may have the faults of too large in one place & too small in another then of Draught don't be equal, of enlarged part will contract of passage of air occasion influxions of Water

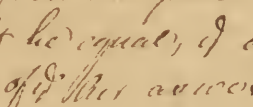

Fig. Water in of large part of returns represented by of Consider dotted lines and hence is retarded owing to of great friction so that the air moves slower in coming out at B than it did in going in at C and of is equally of same in of Chimney.

If if whole of of Chimney is too large then we may consider it as a little worse, as it will move slowly and we never can have the command of our Heat.

In order to determine the Comparative size of Chimney & Fire place, we shall take notes of which has answered best to our observations

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10 Square Inches of Chimney is necessary for a Cubic foot of Fuel especially of Bituminous Coal in order to have the whole Fuel on Fire at one & a considerable heat.

Many People have deceived themselves by raising hot Air in going out of a Large into a small Place and an increased Velocity, but there is no Foundation for this in Prudence, unless impelled behind wherever, as in this Case depends on the Action of the Chimney itself.

The Second thing to be observed that we do to proportion the height of the Chimney to a Feature intended to raise, and should observe that it be without holes.

Many have imagined that by making Holes in the Chimney to Vent the Smoke, could not hurt the Chimney but I can consider that this lets in Cold Air it makes the Chimney act as if it was no longer than from the Fire to the Hole especially if the hole is of any size, but if very small it hurt does not lessen.

It has been recommended to have a Register to make the Fire burn faster or slower at pleasure, and for this purpose they inside the Chimney smaller or larger by means of a Slider acting as a Value or Stinct apart of the Ch[illegible] by smaller they made the Ch[illegible] less Hot &c.

Many Inconveniences attended this,

1st No Slider can be so made but there will be vacuities at the Sides hence can't so well regulate it, and lessening the Column of Air & force of the Fire is always destroyed. Another disadvantage is the Fire can never be check'd suddenly, or if there is always a Sufficiency of Smoke & Smoke Labours rushes out at the Door, & this should be shut completely it's burnt & whole

There is

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There is only one thing to be taken notice of in regard to ye Fire Place, and that is, it should be entirely shut up from ye external Air except at ye Ash hole & Chimney that we may have a more perfect comm. of heat.

Perhaps we thought that it might be an improvement to have ye Fire place made in ye form of a Parabola and the Fire in ye middle, and ingenious thought indeed but not answering in practice; as a square fire place, now as well as one of a round figure not are ye Rays of Heat reflected as those of light are nether are our Materials other than bricks and proper for reflecting ye rays, being porous they absorbe most of them & reflect very few. But its worth taking notice of what figure is in order to apply the heat more equably to ye Body but not for reflecting it.

The Ash hole in general is ye same in all Furnaces & a good deal depends upon its construction. They are to be exactly fitted so that no Air can get in but where we admit it by Air holes of different diameters worked up, so that we can always command ye Heat; wh when admitted by one hole will constantly be equal whatever be ye quantity of Fuel in ye Fire, hence a complete register & we can easily command ye fire & check or increase whence we please. And when these are all shut up no more heat is generated, but it takes sometime before the Fire goes out. It matters not how contrive the holes for the Air to get in whether it be, by a slider, Cocks, Cocks, or what we please, as one versed in Mechanics will find many different ways to do ye same thing. The 2.

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The second is the regard to the Ash hole is that it should be as large as possible in order to make the removing of the Ashes seldom necessary.

Another thing absolutely necessary in the Ash hole is that the Aperture of the Grate (which is considered as part of the Ash hole) should be of the same size as the Chimney Sand of the Fuel is in large pieces the bars may be farther distant if but little Ashes then the bars may be less and the distance betwixt the spaces should be about the same size and breadth of the Bars, this because otherwise a sufficient Draught could not get in —

The last requisite is that the Air should be introduced as cold as possible in some Furnaces the whole art consists in this, as in the Glass houses they the Arches below to let in the Cold Air which burns much condensed more Air is contained in an equal space which in Theory of Fire shall be very good for a great Heat & not any stronger Draught —

There are several Furnaces in which the Ash hole is divided into two parts, the Air let in in one place and the Ashes thrown out at another, upon the most part into the Chimney as in the Boiler furnace — But Furnaces don't differ so much in these particulars as in the Laboratory.

Furnaces are only of 3 sorts, at least there are only three Needful which all may be classed

1 The Baths, where the Laboratory is distinct from the other parts of the Furnace, because the Heat must be transmitted from the Fuel to a Medium & thence to the Body containing the Matter as in Sand, Water, Vapour Baths &c.

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3dly. When ye Laboratory is in the middle of ye Fire or fire place as in ye melting furnace where a great quantity of heat is required. The Pans & others may be considered under this head.

The last we shall consider is where ye Laboratory is in ye Chimney called a Reverberatory where we want a strong & long continued heat.

The Furnace where ye Laboratory is in ye Combole in ye for distilling ye Decoctum —

In Baths ye Heat is always transmitted thro' another Body to that your work upon, viz ye Vessel containing ye Matter. These have particular advantages & disadvantages, wch we shall now consider.

The principal advantage is ye Heat is transmitted equably to ye whole of ye Vessel, another is that no fresh air can touch the Vessel, as in our common manner, by a great quantity of Fuel falling thro' and a stream of fresh air coming up —

The Baths are ye different sorts —

1. The Water, Sand & Vapour Baths & the Cupella Vaporis or Air Bath — There are this difference tho' we don't always use these Bodies in every as for ye Sand Bath, we use Steel Filings & Pyrites as well as Sand sometimes — The properties of wch are,

1st. The Steel Filings make a greater heat and transmitted sooner than ye other & this is observable in all Bodies, that ye greater their specific Gravity they are the sooner heated & consequently colder. Hence in our Apparel Woolens warmer than Drapes & Drapes than flaxen &c and

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and we often find that Gold or Silver in ye Bath will be heated whilst ye Cloth dress is scarcely warm. Ashes are contrary to ye Metal filings as we have in their texture, don't easily transmit Heat & retain it long.

Sand is a medium between these two having in some measure ye properties of each. Hence for a great heat & soon applied we use Metal, for a very slow & equable one, Ashes & for one between these & ye in most cases is sufficient Sand.

The Bain Marie its advantages depend upon ye Liquor not being able to acquire any heat after it is raised to ye Boiling Point. Hence if we want a heat no more than 212 Water will do if no more than 1 Alcohol & Oil of Turpentine 430 or more & Ether boils at 100 Degrees.

The Advantages of ye Bain Vapor is that we get a heat only a little less than ye B. Marie & might be cost'y if in using Alcohol we don't use a Tube &c to condense it again.

Cucurbita Vacua has particular advantages in some Operations & while in use can immediately & immediately damp ye heat, having ye same Heat as if open Fire only ye air not admitted, wh prevents the Vessel from cracking. It would be very convenient if we had a proper Apparatus for it in ye Laboratory

The advantage of ye Melting Furnace is we can raise a very great degree of heat viz of 900 degrees.

Fol. 13

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Sect. 4 B Of the Construction of Furnaces.

We come now to particular Furnaces, only their Mechanical Construction, any one understand the Principles of Mechanics may contrive the rest.

Those constructed for Baths in general are the same only differing in the Vessels in the substance is contained. The advantage that arises from this construction that you command the Heat by means of a Regulator. The Door used formerly solely for Coals, but this required the Ceiling to be broke open to add fresh Fuel, Dr Black found that Sand could not easily penetrated by Air, tho' tho' it is not in its Nature very penetrating. Another Place was made to admitt Air was a Place where the Vessel was intended to stand in, was made to surround the Vessel so that we can take out the Vessel easily & replace it, over this was put Sand to prevent Air getting to the Fire.

Another convenient in the Fire Place is that the very thin, the Outer Plate of Iron or Common Tin gives strength sufficient. It is not liable to accidents interrupting the operation as Common ones were, it was made of Plate Iron the inside of the Oven to Clay about 2 Inches on thickness to adapting to prevent the Iron calcining by the great heat and the thinness of the whole makes it that we can easily incline the neck of the Vessel over into the Receiver and there is space sufficient between the top plate something to prevent the Heat flowing communicated to the Receiver.

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The Chimney may be of Brick, or what we call Stone if we make it of Iron it must be made of twice the thickness of any other part, or must be well lined wth Clay, as it is exposed to ye greatest Heat.

The Chimney if we have but one Furnace should be pretty high but if more than one we must have some shorter than others. Two Foot of Chimney is sufficient for ye generality of Sand Baths, but if a greater Heat is required we may make it 4, 5, or 6 Foot long, or more.

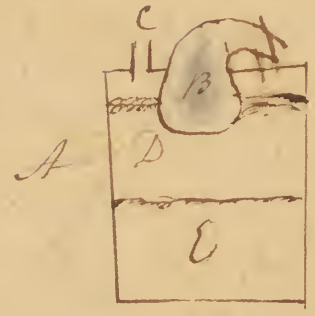
The Ash hole consists of a considerable vacuity to contain ye Ashes and should be as large as possible on ye Fixed Furnaces. Its use is to receive & contain ye Ashes and let them be taken out below, and it should have a Stone made to fit it exactly wch is to be kept rolled on wth Clay to prevent ye Air being admitted this way.

The Place for letting in ye Air should be at the top of the Ash hole that ye Ashes may not fall into it & obstruct ye Air, and it should have a thin Plate of Iron, Tin or Wood to fit it exactly wch is also to be carefully fitted, and Holes of different diameters should be made in it from a quarter of an Inch to 2 Inches and should altogether nearly equal ye Diameter of ye Chimney. Where ye Iron Hoop lays upon ye Ledge it is to be well covered wth Sand, or a little Clay mixed wth it to give it tenacity. and the Body of Furnace wch is made of Brick wch are to be fixed properly wth Mortar, must be lined also with Clay to prevent any Air being admitted.

Now a draw of y^e whole see Fig. 1st —

But for a private Laboratory or Chemist's hut drawn as in Fig 2 is a very good one. — We shall

Fig. 1



No 13

We shall next examine the Apparatus for containing the several matters to be operated upon by Baths, & first the Pot & Pan considerable sand is put & in this is the Retort Crucible or whatever Vessel contains the Matter

For the Water & Vapour Bath the construction of one fig. 1. A represents the section of the Water Vessel B & C Retort in it C. the Pipe for pouring in Water, D & E represent the height the Water should be at for the Water Bath it should be as high as D, but for the Vapour no higher than E. To Prove the Pipe C the Water or Alcohol exhaling and if it is Alcohol we need not many apply a Tube to condense the Vapours

A Furnace for Operations requiring a great degree of heat we have in Fig 2.

The Ash hole here is made of same as in the Sand Heat only it must have its opening as large as the Bottom could with one Stone or plate of Iron, that is now metal full down from the Laboratory it may be removed and with ease & opening large enough to act to advantage.

The Chimney is to be lined of Iron or Bricks or Bricks made of Clay containing little Iron or Alkalies both of which promote its vitrification. The Chimney must be long exclusive great heat about 20 feet in Fuel and must be 8 inches square for a Furnace containing a Cubic foot of Fuel. The Laboratory in this is in the middle, but might be placed at top to make it a Sublimatory.

The

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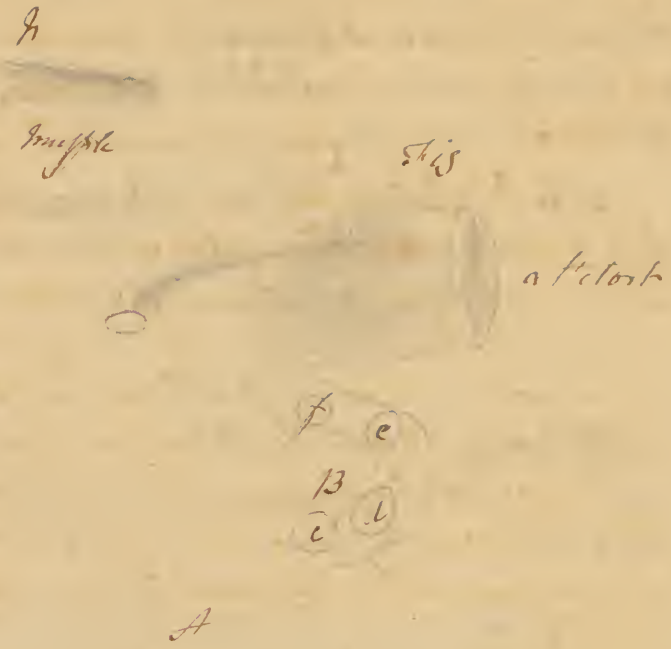


The Door is to be made so as not easily to be too much heated, as 3 Bricks tied together to the Iron hoop and an Iron handle fixed to the Hoop. It should also be luted with Sand & Clay to prevent the Air getting in

In the Laboratory we place a Muffle which prevents the fire getting into the Crucible & the Muffle is made of the same unmelting Matter as Crucibles and is placed upon a Brick to permit the Air to get to the Fuel when we divide we put a Retort made of the same Matter into the place of the Muffle see Fig 1st

Before the Laboratory we have a Door made of Stone with a Window in it of Talk that we may see what is going on within without letting in Air by removing the Door.

These are the General Furnaces, But it often happens in some Particular Furnaces that some properties being lost are made on have them in greater perfection, as in the Smaller Small Furnaces.

The Enamelling Furnace has no Ash hole only a Muffle covered over with Iron & the Air is let in at the Front.

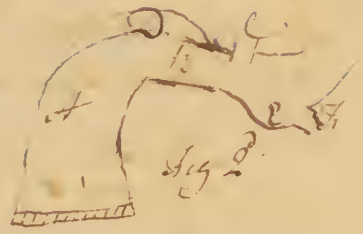
The Sand Furnace requires not a very great Heat only one sufficient to melt Silver and Brass Lead hence no occasion for a High Chimney.

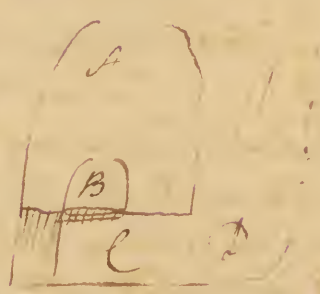
Hence a few Tubes fixed upon one another in our Chamber Furnace will do very well

That for distilling the Vitriolic Acid from the Vitriol Stone and Salt made as at Fig 3.

A the Furnace B its Chimney bent each for a Vessel of Vitriol Stone or Salt.


Fig 1st
A


A
Fig 2d


A
B
C

In the Smelting Furnace the Metal & Ore and Charcoal lye a considerable time in the Chimney which is therefore made large alone partake in Fig 1 A Refreshment to the fire place. It has no Cast hole But at the Bottom is placed a Vessel for receiving the Metal which is taken out at the Side Door.

The Furnace for founding Iron or Copper Vessels or Cannon &c is made as in Fig 2 A the Furnace B its neck or Chimney. C the Place where the Metal is thrown in which is melted by the Heat reflected from D to E & then runs into proper Moulds from F.

The Glass Furnace is of a particular construction as Fig 3: A the Furnace or Stone Wall B the Furnace & C Fire under it. C the Cast Hole which is drawn later in the Pot which contains the Fire form & Heats it by means of the Canal D underground is colder & more condensed, hence two more Pots in equal Space & it is owing to this Institution is not well to carry Fuel.

The Fuels are Charcoal, Pitcoal, Turf Coak Wood Brush Wood, of two last heat by reason of their flame hence not so proper. Charcoal causes an equable but not great heat. Pitcoal a great heat not an equable one, Pitcoal Char'd and Coak a great & pretty equable heat hence very good

Turf a considerable heat & is easily inflamed hence easily kept equable —

Cet Pl

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Lect.^re 4th On the Operations

Having now shewn the Method of raising and the Apparatus for applying a considerable Heat we come now to the Operations

Operations in great degrees of Heat are either for reducing Bodys into the Shape of Paper or Shreddy we shall only speak of Flatter at present.

Operations on Bodies in great degrees of Heat are either for Combination or Seperation

Operations for Combin.^n are Dry Solution, Calcination & Vitrification

We have mentioned in the beginning Lectures that these Operations took place for Combination or Elect.^n In Fermentation indeed we said we could not tell whether it was for Combin.^n or Seper.^n but probably both take place in it, And in these Oper.^ns we now come to we can say wth certainty that they are all for Combin.^n or Seperation except Calcination indeed altho.^h we can't wth certainty say any Combin.^n takes place.

Operations for Combin.^n are (says the Doctor) as far as I know only three amongst wch is ranked Calcination wch we have introduced & wch had generally been supposed for Seper.^n only I have omitted another viz Reduction wch is also ranked amongst the Op.^ns however we shall speak more but first of Calcination

Cal.

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In treating of ye Elements we endeavoured to shew that no Body could act Chemically upon another unless in ye state of fluidity, according to ye Maxim of ye ancient Chymists. Solvitur nil nisi solutum but there exists a vast number of Bodies who are never fluid in our Atmosphere, yet have Chemical directions & may be combined. Therefore we have two Bodies neither of wch are fluid in our Atmosphere & cannot be heat sufficient to melt one of them we make it unite wth ye other & this is called Dry Solution.

Esq. Fixed Sea Salt & Salt Petre mixed, have no Attraction in our Atmosphere, tho they readily have one if put in proper circumstances for taking place. Fixed Salt is brought into a state of fluidity by means of heat it will unite wth ye Fixed Alkali wch if mild will occasion an effervescence, & then unite into a new substance of different properties from either of its principles.

The Dry Solution therefore is where two Bodies have an Attraction for one another but that is hindered from taking place by means of their not being fluid in our Atmosphere. So that it doesn't differ from Watery Solution, except in ye Bodies requiring a greater degree of Heat to make them fluid, it is not owing to any thing but between them to prevent their Attraction, but only Heat is ye applied to separate the Integrant parts so as to make them easily joined form one another and have endeavoured to prove from this, was the cause of fluidity in Bodies.

All

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With regard to Saturation all ye circumstances are ye same in Dry as in Humid solution. Viz.

The 1st method of Saturation is where one Body can only dissolve a certain proportion of ye other & shed only a certain proportion of ye first. This is ye most perfect Saturations and yet this can be had in no Instance in the Dry Way. Each Salt. & Body can only be united in certain proportions to each other, as happens also to ye Acid & Salt in mixed solution.

An instance of ye 2d method in Sulphur & Regulus Antimony, Salt Nitre & Mercury, Sulphur dissolved only by a certain proportion of Oil of Turpentine (ye Solvent) but Oil of Turpentine may be united to any proportion of the Sulphur.

An instance of ye last method of Saturation (tho improperly applied) is where no Saturation takes place at all. As any Metals & may be mixed in any proportion to each other as we see in Tin & Lead.

As to ye terms Menstrum & Solvent we seldom use in Dry solution but if we chuse may apply in Dry as well as in ye Humid, only in ye 1st Method of Dry Solution ye Sulphur or Oil of Salt may be called Menstrum and other Solvent, and in ye last Method also either ye Lead or Tin may be called Menstrum or Solvent.

Thus ye 2d Method we always call ye substance ye can only be united to a certain proportion of other Menstrum and ye other can be indifferently prop: of ye former Solvent. Thus in ye Sulphur & Antimony ye Sulphur called Menstrum & ye Oil Solvent. Thus Humid & Dry Solution don't differ in ye Thing.

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We shall next mention some Rules to be taken notice of in performing ye Operation.

If a very considerable degree of Heat be applied to any Body it will not only be rendred fluid, but a considerable quantity of it will be changed into ~~Vapour~~ Vapour. If two Bodies are to be wanted to combine together in volatility, ye least volatile is to be first melted, and ye more volatile after it. As in mixing Lead & Sulphur, that ye Lead first otherwise almost ye whole of ye Sulphur would be dissipated before it was melted to ye Lead. Or another Method is to melt both in different Degrees of Heat and in certainty separate.

As many Bodies especially of Metals when exposed to considerable Heat are apt to be calcined upon this place principally when the Air has free access to them, then they are to be shut up in close Vessels as in melting Copper & Zinc if ye latter is admitted whilst melting the Zinc is calcined before ye Copper is melted, but if close shut up with a Crucible, and then a unite into a mixed Metal viz Brass.

Moreover we are never to raise a Heat greater than is just absolutely necessary for solution on account of ye volatility or else calcination of Bodies. In ye melting of Metals & Minerals ye Sulphur of too great heat is apt to be ye Regulus will be calcined & ye Sulphur fly off in Fumes & ye gentle heat is to be used.

In performing these Solutions in great degrees of Heat should be taken a Crucible to prevent ye Fume from ye Charcoal should fall in & spoil ye Matter & diffuse itself thro' ye whole & alter ye Compos.

194.

As to ye Resistance to Solution all of them are equally necessary in ye Dry way in Attempted, such as Agitation, Comminution and Solvend, Heat.

The same Precautions are likewise necessary in mixing ye Alkali Volatile Salt, be to guard against the sudden mixing them in large Velocity and gradually like in line matter & found upon Experience if sudden such Ebullition is made as destroys ye Compound.

When a Compound newly formed has arrived to a degree of Heat to melt, then we have Principles did then it has been usually called Fusion and Lead & Sulphur. It is applied also in another sense as in Precipitation & Ignition as we shall see hereafter, and we intend therefore to mention it as Corrosion here as we did in ye burning Salt: when a Metal was rendered less soluble & we wondered then that ye Lead is made into a Cronomlin & Sulphur.

We come now to Calcination a second Operation to take place on Bodies fluid in a great degree of Heat.

Calcination is an addition of something from ye Fire or Air to a Body so as to alter its properties.

Exple If we put Lead into ye Fire its properties will be entirely altered & it will be converted into a Litharge, called Red Lead, & also it a considerable Heat is applied to Water, a part of it goes to fluidity and becomes an Earth, so does Mercury, & also ye Vitriolic Acid.

This differs

No. 21

A particular operation is necessary for these purposes, & the different apparatus made use of have made it be divided into three Heads differing only in Name.

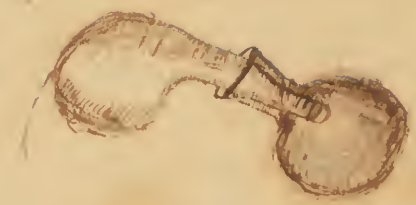
Distillation is either
- Descensum
- Descensum
- ad Caliginem

The first apparatus is such that the Vapours ariseing from the Liquor condensed, the forced descending & there condensed, & may also properly be called Descensum where the Vapours condensed falling down are not forced to descend but only to the bottom.

Distillation & Descensum are most commonly used in our Common Still, wch is generally made of Copper some more of Pewter, but the generality of Stills are of Copper.

The Vapours are collected by a Machine made on purpose wch consists of a Barrow Head attended & fitted into a Hemispherical Figure, round the edge of the Hemisphere is formed a Groove, from wch goes a Pipe to convey the condensed Liquor into the Head. This Hemisphere is contained a considerable quantity of Water wch is take hot & cold, by frequently changing this is called Descensum. There is another Method in other Manufactories, in a large way, that is called strictly Descensum. Distillation by means of a Worm is very good effectual in Stills but being troublesome sometimes. In large Stills they have a Hole made only outside of the Still by and another to fix on & to Hold them. Glass

Fig. 1st



(a) This is (Prof.m Infundibulum) S.t Bolo Barrow.

Glass Stills especially for the Head & Body and will be hereafter shewed under.

Distillation or Obliquum is made in the Glass quite different from all the rest, viz. Retort, Receiver, the Furnace, Contain one of Water to be worked upon where much Spirits obliquely into the Vapours are condensed.

The Retort is made of a material different to be the most convenient to have the Spirits more bent downwards than is common. as in fig 1.

The Neck of the Retort should always go some way into the middle of the Receiver that the Condensed Spirits should run into the Receiver, they are then to be found in proper Lating.

The Luting if no great Heat is used may consist of the White of Eggs & Stone Vegetable Powder, But if great Heat is used Glass should be applied, & may be made more or less tenacious by mixing different proportions of Glass to it. But if the Vapour is to be kept still more close; Clay pulled in the white of Eggs is to be applied and if whole to be coagulated by applying Dry Heat.

If often happens that the Retort Neck is too small the Distance into the Retort Stance, a Hole is therefore made in it & given the Name of Tubulated or rather is put into the Neck of it for Distillation.

It is sometimes necessary to pass the Vapour in very Volatile & Active so as difficult to keep them in the Retort & Receiver a Hole is here made in the Receiver, and

and a Peg is fixed in this, so we can take out occasionally to let the Vapour escape & substitute again.

It is sometimes convenient to have a Tube fixed in this Hole conveyed to another Receiver or to pass into a Phial of Water where the Vapour is condensed, and is converted to Water for gotten the Marine Acid. — This is only contrived for distilling in small Degrees of Heat, when not double in a great Heat we use a Retort made of some substance as Crucibles, but this are seldom used but for Experiments, also for the Vitriolic Acid according to the Way of the Price.

The Glass Retorts are placed in a Sand Heat so that the Neck comes over into the Receiver, and a Paper or Flannel is placed between the Neck & Receiver to prevent its being communicated to the Latter.

Nothing is also made so we can fix a tube upon a Deviation to fit the Receiver as Fig. 1st We have also hole made in it & a Slider to support a Phial so can be taken out below as shall be hereafter. The Hole in Stand is also convenient for another reason because we can incline the Hole in Receiver to pour & draw off any thing so have come over before twice.

Distilled Lavendum was by a Retort so a number of Stones in the Bottom & the Substance so were generally dry being put in first. Fire was applied at the top & the Vapour condens'd below.

Having seen of Distillation & Sublimation is performed, we now come to the Distillation proper Method of Distilling Substances.

Distillatio is { Sine Cum additione

Distillatio sine is Analysis Chemica

Cum additione is sine { a Volatile Elem.
Sine Compound
Rectification
Cohobation

Distillation is either on one Subject itself, mixt & united, and is performed to separate the Elements by Heat. Sometimes it is also for Combination when two or more substances in a state not capable of mixing when each are fixed, yet will when changed into Vapour.

Distillatio sine commonly called Chem Analysis is when we put any Body into a proper Vessel and apply Heat to volatilize part of it, we can clear from the other parts by again condensing it from Vapour. This Operation used to be performed on all Bodies, and was of principal Consideration in the Chemistry, as its degening.

Compounds don't always consist of two Bodies only but of a Number sometimes, and not only of Decomposition but also

is Sine

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a new Combination of Bodies combining as they are in different proportions hence forming different Compounds only it also notes Tendents to recharge separate from each other by this means but only new Combinations.

As to Organic Bodies the Organs assistances by his Inventor desired but many of the properties of Bodies depend upon their Organism, & not upon their Elements. As in Wood &c & Strength of Wood depends upon the Nature & Hardness of the Body.

Hence we can't separate the Mechanical Bodies by his means, and supposing we could Dr Price should never be able to bring their Properties from them.

The main reason given with performance of his Operation, was to prove the Existence of Bodies separate from the Elements for Mechanical purposes but his search go farther & not only separate the Mechanical but Chemical Combinations hence can't have the Properties of Bodies for in Chem. Combination the properties have disappeared some thing in Mechan. indeed they are not. As an Superior Gentleman in Chem. Comb. has visited five separate Chem. & well as Mechan. particles we can't expect could Existence part of any substance in a smaller compass than before. Besides all Animal and Vegetable substances do not from having of same Medical properties, some purging others being Inactive others of Mobility, yet all Animal Substances of same Compounds when Analysed Chemically advance into blue in Vegetables therefore

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Therefore the Chem. Analysis of Bodies neither shewing the Properties of Compounds, nor its Principles for wch we performed the Operation, nor on what the Properties depends, nor do we separate of more of the one from the other. Hence never performed but for particular Products, as on Animal Substances get of Pot Alkali &c. and all Animal Substances yield of same only some in greater others a less quantity but when got of same qualities.

So also we Analyse Vegetables to get an Acid, & an Alkali from Lay except of Tobacco manna or Juppery but no Volatile &c. Oil from this is to be got if they are fresh. Yet we use such plants or parts of Plants as afford of greatest quantity for the least trouble, & little all of same.

The Processes always then performed to get some particular products as Pot Salt. Empyreumatic Oil, & of Acid of Vegetables &c. over upon of applying Wood to heat as soon as a separation has taken place into Elements —

Minerals not being Organised have non of their properties owing to of Organism, hence the Operation must be of same Difficulties here as in Animals & Vegetables. Exple Vitriol of Iron, its Effects don't depend on Iron or Acid alone, those properties are different rather being so much astringent as the Iron was, & so is equal to that other properties, Vitriol of Iron turns a Solution of Galls black but exposed to air & treating Lead nor Mercury it we get will do exp same.

Hence

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Hence the same reasons given for the Analysis of
these and other Mineral substances viz by the Gardiner
product. The principal operation of this sort was
the getting of the Mineral Acids viz. the Vitriolic, Nitrous
& Marine from Green Vitriol, Nitre, & Sea Salt, but
they are now laid aside, as cheaper & easier Methods
are now found out. As the Vitriolic by burning Sulphur
the Nitrous by adding the Vitriolic Acid to Nitre, & the
Acid is separated by an Elective Attraction. Hence
this operation is never performed on Mineral & but
seldom on Animal & Vegetable substances.

We now come to the Second Head of Distillation
or Distillation in Medicine.

This is when besides the Compound we add
another substance, & this by the Assistance of heat renders
the one Volatile & separates it from the other.

It is performed either for Combination or Separation,
for Combination, when by applying Metal to a Body
it is made Volatile, & being converted into the Vapour unites
Chemically for Separation depends upon an Elective Attr.
as in most add a substance to the a stronger & more
Attr. to one part of the Compound. There are two sorts of this

1st When a Body consists of a Volatile & fixed Element.
as Sea Salt consists of an Acid & Earth, the Distillation
is performed by adding something to the fixed Element as
Vitriolic Acid, & that then combines with Volatile Alkali into Vapour
after separation, & by Condensing the Acid is then
from the water.

The

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The 2 Case is when both an Volatile & a combined as ye Vol. Alkali & Sal Ammoniac but if Compound it will be volatile & then its Elements are separate: the Vol. Alkali may be made by adding a substance to after separating one of ye Elements unites wth ye other & makes a fixed instead after Volatilizing y^e

If ye Vol. Alkali added to Sal Ammo: it will make the Volatile stronger than ye Quantity added is generally lost Sal Ammoniac remains, requiring a greater heat to volatilize it than ye Vol. Alkali.

So likewise by adding the Vol. Alkali to Sal Ammo: it unites wth ye Vol. Alkali & makes a Compound very fixed in its nature, ye Vol. Alkali has often lost its volatile & acquired a fixed nature & recommended —

We sometimes perform this Ope^n not only for decomposing Compounds, but also some times for making 2 new Compounds of the same Elements, this called Double Elective Attraction —

Common Antimony consists of Regulus & Sulphur, Glass of Antimony is made of Regulus & the Mineral Alkali, these are very intimately united, they are much volatilized by heat, & two new Compounds are formed, viz. the Glass of Antimony having a great Quantity of it united to Regulus, & the Liver of Antimony, which is called Hepatic Antimony. The Sulphur & Mercury are combined in the Red Sulphur called Cinnabar of Antimony the Glass of Antimony & Liver of Antimony

Sometimes,

Sometimes this is also performed for Combination
as to make the Mineral Ether, wch of Mineral Ether &
Alcohol, the Acid don't unite in a fixed state. The Alcohol
and it is proposed to make a union between them.

We shall now explain a few Terms relating
to these Operations & first Cementation wch is the
Application of Powder to a Metal, some to dissolve
it without making it fluid. Again melting Copper with
Zinc if Copper is applied, the Zinc in Vapour & Compound
is called Brass, and as they are placed in Strata one above
another this Operation has been called Stratification.

Cohabitation is the pouring back the Product
to the Residuum and distilling it again.

In distilling Compound Substances as an
Animal one: the Water Acid Empyreumatic Oil &c come
over together, wch we separate by putting the product
into a smaller Retort, the Acid & Oil Stay behind & come
first over, then the Acid Hardly can pass over. Then
the Empyreumatic Oil turns out. This Rectification
and care is taken when we do regulate that what
only the Substance we want shall come over.

When Oil & Water only come over together they may be separ-
ated by a Funnel.

In distilling such a Oil Substance with water,
as great Heat is taken used as will consequent that
the time may be taken & high Burner used.

The Principal Caution after having chose proper
Vessels is to apply the Heat very gently & [illegible]

And let all come over that can, before it be too late.

The 1st thing necessary in going to Barbados is making Provisions. is to have proper materials to be worked upon. and as there is many sorts blended by the trading Passengers, this necessary for us to be well acquainted with Minerals & look over good Collections wch Museum and read such Authors as have wrote best upon subjects as a Wallenius a German in Latin, & French, D. Costa is dead, except these two very few others have described things as they were then. And this is indeed surprising that Naturalists should in each age claim less to truth than other People, even Mede in his Mondes Primeval mentions his young such things as he never did. & still hardescribed many things wch had no existence in Nature. Natural History therefore is to be studied, to know the Productions & Nature & Chemistry thereof, & the Compounds of Nature productions.

We should next look over some description of Process considered in all its branches, so that no point in time of Operation be pinning about which is next to be done. Patience is also very requisite for a person least hurrying may spoil the Operation, & there is an Improvement lost &c. After thoroughly understanding the Process, we are to consider what our inconvenience may arise in performing it. As in distilling Rum and Molasses we must consider that Fumes are inflammable & must be carried from the Still by Pipes or other wise escape &c.

We are

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Sec 22 We are then to consider, whether or no the Cold can be applied indifferently at any time during the Operation & how best to apply it.

As a Number of Chymical Processes are often retarded or hinder'd by the Heat, we should consider, whether the Heat be an impediment or Destruction of it is proper. We are likewise to consider the quality of Heat & how much or how little, or whether it is Hot Cold Moist or Dry, whether the Heat is Cold or Warm, get a greater Heat than this but by degrees or more suddenly & strong & violent. And if the Air is to be more or less Volatile Medicines are dissipated, warm making lighter.

Being thus Masters of the Process we must be sufficiently time in performing it & the Patience proper Cautions.

Lastly, in describing any Chymical Operation every circumstance is to be carefully mentioned, as the time of day, the Heat or Cold, the Atmosphere, the Dryness or Moisture, the quantity of Heat applied, the volume of Atmosphere &c, and to state exactly what Sulphur & Salt in Grains, & how from Sulphur a double quantity is gotten, more Air.

After all Practicing a few Operations ourselves is of more service than reading Volumes with Concise & Short on depending upon so many minute circumstances, and we are often finding out some one or other in us we had not before Mention'd to —

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Art: 1 of 19. Of the Indications for giving Medicine.

We have endeavoured to prove, that general affections of the System were all Inflammatory. In Pleurisies will the Symptoms that are confined to some particular part of the Lungs as the Exudations or Exhalants. In Palsys we may say of those parts properly only of external organs a Sensorial Palsy must be Death.

Even in not an affection of the whole System, but an Alteration in the Balance of Fluids and the System about the Nervous Powers being affected thro' the System, perhaps these may be still more strikingly issue reduce all the affections to three Heads, as we argue that there are but two diseases but what may be referred to Inflammation, Rheumatism & Debility as Spasms (tho' also may be Inflammatory) and Rheumatism. It is pretty likewise generally to be owing to Rheumatism and Debility of the Muscles of the Eye.

We shall endeavour briefly to explain the Nature of each of these three Disorders.

Inflammation is a swelling, in a particular part of the Body, the Heat, Pain, Redness & Tension of the Tissues comprehended in the Cause of Inflamm.n But yet Question is, what the Cause of Inflamm.n has been supposed to be an Obstruction in the small Arteries, so that all the Blood could not get thro' is now determined to the part. This is indeed self evident but the Question is of what Nature is the Obstruction, whether

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whether is it from an encreased Velocity in ye Blood or an encreased Contraction in ye small Vessels.

The Blood was supposed to be thickened and shall first examine that opinion.

The Blood consists of three different parts Serum, Coagulable Lymph & Red Globules. 1st is impossible that ye first could ever form obstruction for ye Serum is not later coagulated unless the other blood is applied to it, but cannot be from ye lymph coagulated for as soon as that passes place the heart becomes dead, but no Inflammation is caused, the cause in ye Umbelical Funis, or if the sufficient degree of Cold is applied, for Cold does coagulate the Serum but then ye Limb is dead. Therefore according Common state of our Body it is impossible it should be coagulated, hence can't obstruct the Vessels and indeed it is as hard to Water Vessels as to very small Vessels.

Another thing that has generally been said is, that it is ye Coagulable Lymph, yt first comes to top of ye Blood in Pleurisy, yt causes Obstructions & retain Blood from a person in this Complaint the Blood is not round neither, but as thin as Mother and the Coagulable Lymph remains sometime fluid, until a sufficient degree of Cold is applied to separate it, but this Cold can never be applied in ye Body.

It is also certain that if any thing could coagulate it in ye Body it would make it that it would not separate readily as it does when mixed with a solution of Gum,

Therefore


B
C
A
A
D

[illegible]

therefore we have no reason to think so, but rather the contrary, because it separates sooner.

Hence we can't say that this Matter but rather thinner in the Inflammations, however it is not that hurtful to inferior from the Vein, since we have occasion blood to darkish Velocity & moderately Coldness the Coagulable Lymph & rolled of accumulating serum remain fluid till a certain degree of Heat or Cold is applied.

But we can't imagine that either of these could do it, the only supposition left is that it must be two or three Red Globules uniting into one Mass, this may have sometimes happened, at some little imagining very Colour observ: Artery is more from the running to red, & very Vein a Vein alone also, but this cannot be, as some Vessels are both Arteries & Vein as the Lateral Branches and there is a Retrograde Motion, hence 'tis impossible that Obstruction can be two ways accounted for, then suppose two Globules of Red are coagulated or united into one Mass they undivide rather than come to a small Vessel, for then they stop up at the end and rest, yet as there is a Retrograde Motion from the little Vessel back to the large Vessel & so on can happen and it does happen that there is a Retrograde Motion as we see by looking thro' microscopes, and can suppose it could stretch upon the Vessel & would be contracted into the Ligament instead of each other, & no Inflammation happen as we see the Sphincter Ligament is formed.

Hence it is evident that no Obstruction can happen, now this is true. It must be by a universal contraction of all Arteries and Veins, the proof of this is

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is therefore an Obstruction, when ever more Blood is thrown into ye part inflamed than can get thro' it first from ally small Vessels being contracted in their Diameters, & from a greater quantity than usual being derived thereto. Wee Explain this —

Suppose the Obstruction how already taken, plac'd Wee what force it is that dilates the Vessels thus above their natural size. Neither the Heart nor Arteries, being naturally cando this, yet it happens which the Heart does naturally, it must therefore be from some other Cause.

The Blood is forced forwards 2 ways, first by ye Heart and then by ye Arteries, and as ye Arteries don't occasion this naturally it must be by some preter-natural Contraction, and this must be only by their acting by means of some Spring Power or other Vnot in ye same way as in ye dead Body, by Elasticity only, for Elasticity must be provoked before it acts & ye Heart does not act more than usual it can't happen

It has been advanced that ye small Arteries are not more dilated than ye Natural State but the Blood is only thrown into ye Cellular Membrane, but they are certainly dilated as we see plainly in Cases of Age, and an Ophthalmia occasions no Inflammation —

Therefore this Distension must be occasioned by ye greater Action of ye Arteries, and yet this can't happen in respect to their Elasticity, for

for

(a) To explain it take this scheme

If the Vessel B contracts almost its whole Diameter it will shed more Blood out in a given time than if it contracted only to A

for suppose their Elasticity were greater at one time it would require a greater force to act upon it or provoke it. as Action & Reaction in Mechanics are always equal & contrary, there must be by an increased power of contraction, from the Nerves or Nervous Power & thro' this the Blood in such a manner as to occasion Inflammation, and we would rather imagine that there is no contraction in Inflam.n as the Vessels appear fuller & more Blood circulates thro' them in a quicker time.

Inflam.n then we imagine is no more than an increased contraction or action of the Arteries of a Place in consequence of some irritation applied to them, and this very well accounts for the Symptoms as the Swelling from more Blood than usual being in them & redness from the Blood giving that Colour by its being forced into Vessels wh did not use to admit red Blood, & then from the great distension of the Vessels. Heat from the increased action of the Nerves wh we shall hereafter prove to be the Cause of Animal heat.

To this an Objection has been made that an Artery would not drive more Blood forward into it than the larger Artery did into it, this would be the case indeed if they had only one Elasticity — see the Scheme — for an Explanation —

If the Artery at the Place is distended equally, wd be in a Dilatation and the Nerves making the Vessel contract nearly alike it will force more Blood into it.

Reasoning

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I have so found out of Dis ease let us suppose a Remedy
that this Fermentation is another Indication, we
shall be off this Spasm & we shall call it an
that term that has been applied to Inflammatory Constitu-
tions we shall call this so tho' some accuse the
term Strong this without any Meaning —

We never could say a priori that any Medicine
would cure the Inflam.n we are therefore obliged to
to Experiment to know the Medicine that is appropriate.

One thing we know that in this a Spasm and
owing to the too strong Action of the Nervous Power, any thing
that weakens the Constitution such as especially
Evacuations, & other, Blood letting is the most powerful
& this we may explain in some Measure as it is
a Relaxation & medicines apply without Irritation
as Purging relaxes much & all irritation increases
Inflam.n Hence the good Effects of Vis. must be evident.

Practice by the Rule is as fallacious as
any Theory, for we see many of our best practitioners
prescribing Remedies for Indices & they say have
cured & they are sure will do again, but as we know
that in Disorders often arising to a Stone in the Bladder
Quack & consequently know that these Medicines can
have no such Effect. Theory indeed Deceitfully, but
tho we get a good Theory we shall never be able to
practice in a proper manner.

Propriorum happens that all the Libels
against Tom should be applied to this Spasmus so

Cordial

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Venesection in any Vessel answers, But it also sometimes happens that it is only partial or affecting some particular Organs in w^h case Imploying those w^h are nearest them is of great relief to them and other does not, And it often happens that tho' the system is weak an Inflammation attacks some particular part, it is more likely to do so then indeed, as if Weather the system is of more or less liable to Irritation. Imploying of Opium in general therefore is not so proper & many Inflam^ns are increased by this, and this we see plainly in Inflam^ns of the Eyes w^h often happen in weak Systems w^h we imagine by bleeding in the Arm but if we bleed in leaches near the Eye or open the temporal Artery, we generally remove it unless of long standing & then requires a particular treatment w^h we shall speak presently. This is the Method.

1 The Second Method is by Irritating a particular part w^h we can take off a spasm near it, & this has been taken notice of, from the Learning of Physic they said it is like a greater Pain obscuring a less, but we see it not for that alone a Cholic often takes off headaches. A Case I saw says he in an Hospital where a Patient was ordered to be bled and have a Blister applied to his Throat for a Quinsey, But the Bleeding being forgot the Blister was applied and cured the Patient by next Morning tho' he could scarce breath before. But this is not proper in all Cases of Inflam^n,

Resolution

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So when the System is in general elevated it not only irritates the Prophlogistic whole System but perhaps to good Effects may sometimes have recourse to Bleeding that is hardness, but when the Irritation is cont'd it is always of service.

Also towards the end of Inflam^ns when the whole is not now affected an Irritation often remains from the This is the 2^d Indication & should always be pursu'd in assemble, pain, Tumors & heat respective

Another Indication is to apply such Medicines as will take off the Tension or rouse the Inflam^n we can't say a priori but only from Experiments what will do this. but not being able to say has been used as an Ly most advantageously being any such.

Of these Medicines we have a good many, as Addit, Emollients or Aromatics to the part affected or Astringents as Alum by Eye &c. all both in the Sphacelistic & Interpuncti & thus cure immediately and if these were safe & we always knew Medicines that would do it this would be a great Method of Cure

We have still another way and that is by the Application of Medicines to the Stomach, as occasion a free Circulation thro' the System. and the reason is very strong they often encrease the Disease & only affect towards the end. Of this sort is Antimony (Tartar Emetic) wch in a Pleurisy after the Pain remains after the Pleurisy has had no effect on the Pleura, but the whole System is affected. It

It could encrease the Disease.

Wood Suppuration & Gangrene are terminations of Inflam.ns that shall vary nothing further we may
Hathe noted that the Globules of Blood not being able
to pass thro the Vessels are forced into the Cellular substance
& being there extravasated now is brought to Suppuration
It is worth remarking that this Suppuration can
never take place but during Inflam.n whether it is
owing to the heat raised it is necessary for the
Suppuration, Fermentation, or some other requisites
to be being sometimes absent, we want Medicines wch
will occasion Inflam.n wherein the Matter remains
imprisoned in the Arteries or rather Cellular Membrane
especially in Glandulous parts, as Arteries probably
are seldom bloodvessels & ill consequences attend
when they are, But if the Layer is not Cuticle
it will always occasion bad Symptoms.

Hence it is often necessary strong Cords are applied
as in Cancers to obstruct an Inflam.n; & many
have indeavoured to particularly by the Belladona
or Nightshade and of Cicuta Dulcis, & if they have
any good Effect must be by their inducing Inflam.n
wch if raised into Constitution will be more Effectual
to fall on a part already weak, But often they happen
in another part, and thus hastened a cure & of Belladona
many have been cured but more killed by the
Inflam.n not having been attended to. Good Medicine
should have been discontinued soon and begun
to appear in a different Way.

They have also been relyd upon when applyd to ye Parts, and its not improbable but they may have good Effects tho we have no instances of ye well attested.

As to ye second Disease ye happens to particular parts the Rheumatism, it is when any part is much pain'd but without swelling or very little & that only in consequence of Extravasation without any redness ye seeds made it called an Inflammation —

It is a sinum or preternatural contraction of ye small Vessels, the Pain is caus'd by the violent Action of ye Arteries endeavouring to open those ye are obstructed, and if this is considerable the whole System are not able to do hence no Dilatation or Redness in other respects it resembles an Inflammation —

Always when Blood is forced into Vessels not able to circulate it a Rheumatism is occasion'd, & in tying up a large Artery, in a Limb, if small ones are not dilated, if Blood not having strength enough, to do that tho' enough to dilate them so far as to occasion Pain

In this it resembles a Fever and is to be treated as such by giving Medicines into ye Stomach ye promote a free Circulation, as this Spasm is a little Analogous to ye Inflam'd it also ought may be removed.

All these Diseases arising in Spasm, all other to Debility.

J.

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A Dropsy is a debility of the Exhalents & Want of the Absorbent Vessels, & is either partial or universal as the whole or only a part of them are affected.

The Indications of Cure are plain, viz

Either to strengthen the Exhalents or make Absorbents attract more Water. The first is done by strengthening the System in general by Bitters &c. & by strengthening the Absorbents in enabling them to overcome a Degree, or else to make a great Evacuation in another part as by the Urine &c. & being a Law in the System that an Wash increased in one part diminishes one in another. Another way is to irritate the parts strongly, hence Dropsy's have been cured by the Irritation of a Flea's Bite. It would be of great advantage to us if we could get a Medicine for this would make the Absorbents act strongly without being applied to the Stomach, & without encreasing any Evacuation. This may perhaps be afforded by the Materia Medica. And was much a question whether a Medicine would be found to allay Irritability till the Bark was discovered.

The Absorption seems to depend upon the Vis Vitæ & not upon the Attraction of the Capillary Tubes, as there is no Absorption by Insensible Dead Body.

A Palsy seems to be a weakness or a partial destruction of the Nervous Power in some Parts of the System, for if we cut the back strongly, it will

The Table of Neutral Salts, or of Commonness Ser. 12.

Fixed Veg. Alk. makes with the	Nitric Nitrous Muriatic Vegetable	Nitrs	Nitrated Tartar Comm. Nitre Sal Diuretic Sylvii Regenerated Tartar
Fixed Fossil Alk. makes with	Nitric Nitrous Muriatic Vegetable	Nitrs Muriates and	True Glauber's Salt Cubic Nitre Comm. Sulphur. Salgem Polychrest or Sal Nitre
Vol. Alk. makes with	Nitric Nitrous Muriatic Vegetable	Nitrs Muriates	Nitr. or Sal Ammon. Nitr. Ammoniac Comm. Ammoniac Sal. Polychrest

Some of these have several Names see other Tables

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dwell do so by Custom. The Cure is by continual Stimuli being applied to the Skin & increasing the Nervous Power, as by Simple Bitters, Electricity —

Thus have we shown the Indications for giving Medicines. 1st To cause a free Circulation and Action of the Nervous Power by Medicines applied to the Stomach. 2dly To take off Irritability so as to prevent Indigestion, or at least its return.

3rd Applying Antispasmodics to take off Spasms. 4th To take off Inflammatory Diathesis from the whole System, or the Inflam. Spasm, pain or any part. 5th To bring on an Irritation on one Part to take off pain in another

6th To support the Nervous Power by Stimuli either to the whole System as in Fluxes and Fevers, or some particular Part as in the Palsy.

7th To occasion a Secretion from some particular Glands by applying such Medicines as have a particular Effect on them, and this depends upon their getting into the Blood. Having again secreted into the Glands, and tho' they are not in such quantity as to have any particular Effect on the Blood when secreted again, consequently will not be may produce the desired Effect as the Glands contain little Liquor in comparison to the whole System. Tho' they are the most sensible of any parts, may be affected by the Smallest of Medicines conveyed to them.

Vest. 20.

Menstruum	Solvend	Means & Result & Appearances	Residuum	New Substances generated.
Vitriol Acid Acid Universale. — Primogenium Vagus Spiritus Aerium Stellatum	Animal & Vegetable Phlogiston except Essential Oils	"Mix add" a Addition Distillation Great Heat is generated	Black mass Sal Vitriolis & leaves a true mineral Sulphur behind	With Alcohol Ether Of Dulce fixed Salt.
Calcareous Aluminosum Spt Vitriol Sulphur Zinc	Fossil Oil Sulphur.	not kn if sulphur be moistened with water expose to air if acid is increased & inflame.	If distilled Acid: Vitr Vol.	If w Sulphur Mallerdium vinished Cal
	Fixt Vegetable Alkali	Addition Heat is generated	Vitriol Kali Tart Vitriolat Sal de Duobus Sal Polychrest Sal Prunella Arcan Duplicat	Magnesia unites with the acid into Vitr Magn. or Epsom Salt
	Fixt Fossil Alkali	Slow Solution & Effervescence with Sea	Vitriol Natrosum Sal Glauberi	magnesia.
	Calcareous Earth	Precipitation of Earth from a solution on as magnesia any other Acid	Vitriol Seleniticum Gypsum Selenites Selenites	marmor. Alabastrum
	Volat Alkali	Addition Heat is generated	Vitr Ammon a Cake Amm Secret.	
Acid Primogen. it all out in the last table.	Animal Substances	Distilled whole — air stop all fermentations	a Black mass of an	by Distill Vol Vitr Acid & Veg Sal Volat

Lect. 20. On Distilled Acid &c

Having given the Foundation for the Operations & Rules for performing them, we now to the Particular History of Bodies, intending upon the Chemical Principles that Effects on the Human Body, first what Effects they make in the Machine, & in the Blood & Humors.

It has been customary to treat of these under the Name of Poisons & Poisons, & under the Heads, Animal, Vegetable & Mineral. But as Poisonous Substance is found in more than one of these, it will appear different Bounds hence & many Names of Acid.

We have therefore altered the common Method of treating of them, and shall do it under proper Heads. First we shall Explain Saline, Inflammable, Earthy, Watery &c. Regarding the Saline as they have the greatest Reference to the other Classes of Consubstances.

Saline Substances are such as are soluble in Water but not Inflammable. Such Substances are called Salts. This Definition is not without exception, as there is one soluble in Water & is an Earth, Lime, viz. & another is an Inflammable called Sal Ammoniac. The Lime as it is not soluble in its Mild state is therefore classed among the Earths. The Sal Ammoniac is inflammable but only by a Combination, the Acid uniting to the Phlogiston, for the Sal Alkali is consistent. Phlogiston & some other substance is necessary not —

Saline

Magnesia Vitr. Acid.	Magnesia	Addition	Vitr.m Magnesiae / Epsom Salt / Sal Glaub. Solum
—	Lime	Dilute acid in Bp.th Flo.r heat w. effervescence	Vitriol.m Lime / Vitriol Alb.	Inflam.n Alcali is separated
—	Lead	Concentrated Acid Boiling Heat	Vitr.m Plumbi a true Corrosion
	Cobalt	Acid diluted 4th 2ce its weight of Water Heat	Vitr.m Cobalti
	Tin	Concentrated Acid Heat	Vitr.m Stanni the Tin is thrown down by Water and Antimony Butter of Antimony
	Iron	Dilute Acid 4th 6 times its w.t of Wa.r	Vitr.m Ferri green Vitriol Sal Martis	Inflam.n Alcali is generated
	Bismuth	Concent.d Acid or by add.n of Bp.th to a solut.n of Silver in Acid. Vid. P. 7 of No. 7.	Vitr.m Bismuthi the Bismuth may be thrown down by Water
	Regul. of Antimony	By boiling in Conc. Acid Dilute	Vitriol Antimon
	Copper	Acid of a specific Gravity to Water as 10 to 18.	Vitriol.m Cupri
	Regul. of Arsenic	easy Calcination applying Acid to Vitr. Arsenic dissolved.	Vitr Arsenic a Corrosion
	Mercury	Concent.d Acid Boiling Heat	Vitr.m Mercurii Sublimate Mercurial a mortal Corrosion	a Volatile Vitr. Acid flies off v.d.m. di Cu.

Saline substances are either simple Chemical Elements or Compound consisting of Saline and Acid or one saline and some other substance united to it.

The Vitr. Acid & Vegetable Kali are simple Saline substances, & Tricorted Tartar a Compound one so also Vitriol of Iron the Acid is simple & one simple saline joined to Iron and other substances.

Compound Salts then are either Neutral such as are made of a Saline & Metallic such as consists of one joined to a Metal, & Earthy or such as consists of a saline substance and an Earth.

As it is difficult to treat of a Compound till we have treated of both its Elements, after wch we shall more easily understand it, we therefore shall begin wth a simple saline as Acids & Alkalis and first begin wth Acids in wch we have made a Distinction not very Common and that is to divide them into two Classes 1 Common & Uncommon. The Common are 1. Vitriolic Acid 2. Nitr. & 3. Muriatic

The Uncommon are 4. Acid of Amber — of Borax. Acids Animal, as Phosphoric & Acids Vegetable as Acid of Tartar. Both are alike in their properties joined to a Common one, & as we are not much acquainted wth them we shall treat of them all under one Head.

The Acids are three whose Bases are Sulphur, Nitre & Salt.

W.C.

Mercury		or boiling heat.		
Vitr. Acid	Silver	After having dissolved the Silver in ye Nitric Acid precipitated it by ye Vitriolic	Vitriol Argenti	
	Gold			
	Platina	Cullen believes it will not evaporate		
	Clay	thoroughly concentrated Acid. boiling to dryness & then moistening it with water evaporating low ye Acid w ye water	ing ye W. filtrat. & evap. ye Alum yields ye Alum when ye Salt Effloresces then liquifies	
	Earth of Alum	Dilute Acid	Vitriol. Aluminosum Common Alum	
	Chrystallin Earth	After being first made into Soluble Glass by a fixed Alkali & then ye Acid. (a)	no effect.	
	Water	Addition great heat is generated, attracts it from ye Air	Dilute Acid	Part of Acid is calcined
	Camphor	Concent. Acid	a thick black Mass	
	Ether	Concent. Acid	blackish Mass	a Salt

(a) This ye Author lately discovered after dissolving clay in Acid it is to be precipitated by an Acid & then addition of more Acid to ye Precipitate

We reckon an Acid to be such a substance as will convert an Alkali into a Neutral Salt and an Alkali to be such as will convert an Acid into a Neutral Salt. And this is the Criterion by which we can know Acids & Alkalies and if we have either can distinguish it to be an Acid or Alkali, there is no other proof given. Acids indeed change Vegetable Colours red but many other substances do the same, Alkalies change them green but so does the Earthy Salts.

Acids & Alkalies in forming Neutral Salts observe a perfect Scale of Saturation only a given proportion of one being able to unite with a certain proportion of the other, as 3 lb of Acid same to be satisfied for 3 qrs of Alkali & this can not be varied.

Hence there can only be 18 of Salts to be represented in the Table. to be explained.

These are all the Salts we shall treat of at present. Tho there are 8 uncommon Acids & 8 Alkalies yet they will make but 18 Salts & of 3 Alkalies so that there is in all 36 Salts & 18 common ones.

In treating of Chemical History we shall begin in the Natural one, or the manner in which they are found Native & in what Strength & Stand. after wards proceed to shew how they are to be separated & in what manner, afterwards proceed to their simple qualities as their fluid, solid, colour, odour &c. and

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Mensur
Sp.

And first by shewing the Effect they have when applied to other substances, first on the Saline then on Inflam.ble, Metalline, Earthy & Watery, & last of all on Aqueous or compound Animal Substances, & Vegetables.

But we begin with the Saline, we shall first give the Hist. & Chemical History of Nitre, & shall treat of the 4 Common Acids first and afterwards of the Uncommon, & shall shew them in their Order of Elect. Attraction to Alkalies as being most simple, & then of Nitrous, then of Nitrous Mur. & Vegetable.

To begin with the Natural History of the Nitrous

The Nitrous Acid is found 4 different ways as in the Bowels of the Earth, floating in the Air, Generated or Collected in burning Fires, for when Fuel burns all its Nitrous being fixed & fixt becomes a Character from burning this a great Quantity of Nitrous Acid is produced, tho there was no Symptom of it in the Fuel before. Hence the Bad Effects to those who burn Charcoal shewing it's Fumes smell so offensive, and of same nature from Vegetable Charcoal as that from Common Coal

It has also been collected from the Air.

Another way is it's generated or collected by Electricity or Electrons, it's generated or collected it, for we always find it in the Deflagration of any quantity of Electric Matter. & further if a sharp Instrument Electrified be pointed against the Sun & Regulus it converts it into Nitrated Tartar as sure sign of its containing Nitrous Acid —

Ye

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We shall next shew in what forms this Dis
takes different Places.

In the Bowels of Earth it is found pure & in its simple state in one Case only, viz. when any quantity of it happens to be collected in any Cavity in the Earth, forms one or more terminated Crystals, partly of Vitreous Electric condensed on the sides of the Cavity, & partly into Water and appears in Springs, such are in Britain & Ireland & Sweden some in Scotland. But in all Combinations it is very often found in Earth, never in the Fixed Vegetables but Volatile Oils are never pure, but always in the Fixed Fossile Alkali making true Spermaceti & Salts but never in the Mineral making Magnesia Epsom Salt & has often been taken for it. It is never found combined in an Inflammable unless Volatile & Fossile Oil and in Sulphur in great quantities. Whether it has been a Question whether Sulphur does not wholly consist of this Element 316 affords 315 of it and perhaps the Inflammable only different Modification of Matter, these we would say that Sulphur is only a different Modification of it.

It is found combined in Metals in substances called Vitriols as Blue & Green Vitriol.

It is found in Calcareous Earth in Lime Stone Selenites Fusible Spar Asbestos &c. It is found in Earth of Alum in Common Alum.

We come next to shew it is to be separated from these that we may have it pure for Medical purposes.

It is only separated from about three Metals Iron & Sulphur.

At

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Fig 1

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It is not now separated from Coral, it was formerly done by destroying the Attraction, by means of a Fire of Furnace wherein condensed & came out into Flowers. The Furnace for that purpose had a Elaboratory & Chimney way for the Earth & Water to pass off & the pour was conducted to a receiver adapted to it. See Fig. 9th

It is now made from the Silver only from the Stone separated by mere inflam.n & only in large Works as I was told done by Bell. It was a very large Glass made of a Pear shape, under the Sulphur was put in a Crucible & if Vapour when condensed turned down the Side of Bell. It had a Spout placed here to receive it. Itself, resting upon to Stand to hold as large as possible & inside one to hold hugo Water & the Water.

The Vessel in which now done is a large Stone Chamber, one of the thing have a Prodigious Pans, & one belonging to Lord Lucin Lauder. It is made as at Fig 2: Lauder Chamber is made because Lauder is valuable & Lead are plain Building Stone.

We have then this state of Manufacture being made to a quantity of Water & Sulphur & Silver to make it black & necessary for Coal Fumes from the Water by Heat to destroy the Attraction & the Water comes over, & Vitriolic Acid remaining in the Inflam.n Mass. but the Steeping contained Glauber Salt which is a part of Salt & Water in a white Powder & Glauber want it to be Shared, after separating the Water & apply a gr. i Theriac Vitriolic & to the Water

but the former method is sufficient for most purposes.

It is also separated another way for some particular purposes from Sulphur, it is exposed to the air & rain in consequence becomes decomposed & Acid separated, this way is procured vitriol of Iron & Copper —

When got pure it is a fluid perfectly transparent & not volatile & indestructible, it is sometimes however found solid Crystalized, in which it is not owing to its concentrated state, but some particular circumstances they accident only & not to be accounted for —

If a degree of cold greater than our Atmosphere is applied it freezes becoming solid another fluid &c. It is a fluid except Mercury & greatest specific gravity being as 18 to 10. then an equal bulk of Water & the latter when weighed 18 lbs 03 drams & whilst Water is only 10 —

It has been common to have it in shops of different degrees of concentration hence called Oil of Vitriol but this is a very bad way, as the Oil sometimes contains one half sometimes only a quarter its weight of Water & sometimes more. It would be better therefore always to prescribe it according to its Specific Gravity & should be kept in the greatest degree of concentration & to be diluted as occasion requires.

It dissolves Alkalies, Earths & Metals, & has greatest affinity of all Acids to the two first but less than Muriatic to Metals. Some such for its properties

It has had many names according as obtained from different substances, as Sulphuric, Vitriolic and

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(a) Upon mixing the Water a solute holder is precipitated & Heat is generated, & Holder is only a part of the Water calcined by the Great Heat wch was generated.

and was held a preparation standing in the Dispensatory under the Title of Gas Sulphuris Vol. Spirits from the Volatile Acid. It is also named Sulphur got from Aqua Alum and Nitr from Coal called Reddum Alcum & from the Boracic Earth Reddum Borax Fossile

It unites with the Alkalies into Neutral Salts whose properties we shall speak of after we have done those of the Alkalies. With the Fixed Alkali it makes Tart Vitriol & Liquid Fossile Sal Glauber. ver. & Vol Alk. Secret or Vitriolic Ammoniac. Lime white Vitriol Iron Green Copper Blue Vitriol, Cobalt a particular Sympathetic Salt. Lead a Vitriol. Lead has a corrosion. Mercury Turbith Mineral. Gold & Silver Corrosive from the Fixed &c.

To explain this see the Tables of Vitriolic Acid

With the Alkalies makes B. & Salts. and the Metals Metallic ones, the Corrosive Specimens are shewn

It unites with alcohol & forms Sulphur & indeed consists of it & Phlogiston. it unites with the Inflammable Spirits, Fossile & Empyreumatic Oils & the Other matters & shall be Mistance & shall & would afford Vol Vitriolic Acid. With the Earths makes Gypsum Selenites &c. with the Earth of Alum Crystals with Magnesia, Epsom Salts, with Chrystalline Earth Clay it makes others, which we are not acquainted see Table with Water it makes Dulcis Acid (x)

With Animal Substances especially fluids it coagulates & then dissolves them, It also dissolves Vegetables so far for the Elements. With the Compound it either decompose them or have no Effect upon them —

Acids other properties & Horses Comp. shall speak master —

Acid II

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Lecture 4th — on the Nitrous Acide

Having treated of the Vitriolic Acid, we now come to the Nitrous in order of next affinity to Alkalies.

The Nitrous Acid is never found pure nor in any of its combinations in the Bowels of the Earth below the surface or a foot deep in the soil covering the Earth. It has been supposed to be found in many of the Mineral Waters in imbibing their Chemical Virtues but these Experiments were either made by People who knew nothing of Nitre but to the Eye, particularly that mistook Magnesia Glauber's salt for it. Dr Hume sensible of the Deflagration being the Act of Nitre, did it and deflagrated that in this but certainly upon the Salt, as he had its probable mixt. the Experiments, indeed we detect him in one place where he says that he deposited Chalk in the Nitrous Acid & dropped it into Water, and it was soluble; but this was no Calcareous Selenites as we know wont deposited in Water. Now we prove this & other is probable also to be false. Besides People who have since made the Experiments on these Waters have got the Magnesia Glauber Salts from them.

Neither is it ever found in the Air, in which we find only the Vitriolic except in great Towns where of much Putrid Matter, which is mostly the Vitriolic Acid contrary to what the Illustrious Mr Hales seems inclined to prove but they are really the Vitriolic Acid Earth

Tor.

Menstruum	Solvend	Means of Solution & Appearances	Result	New Substances generated
Nitrous Acid Sp. Nitri Nitri glaub. dig Sorbis	Litharge & bits	Water — Concentrated Acid very great heat — a little Vitriol Acid flux added so as to flux	a Resin & Substance	
	Essential bits	Volume w th c of Acid if very much concentrated with it & Distilled	Acid diluted Lapis Nitros Spent.	
	Animal & Vegetable Substances	Concentrated Acid Addition	a Yellowish Brass	
	Mercury	Acid diluted so as to be green — Great Heat & Ebullition happens therefore to be made in large Vessels	Sp. Nitri Dulc	Ether is made in close Vessels according to Dr Jos otherwise Lapis of
Fixed Vegetable Alkali	Addition		Nitr Kali common Nitre	Magnesia
Fixed Mineral Alkali	—		Nitr Natrosum Cubic Nitre	Magnesia
Calc Earth	—		Nitrum Selenitic Boyonian Phosphorus	
Volatile Alkali			Nitr Ammoniacale	
Magnesia			Nitr Magnesia Mother of Nitre	
Lime	Addition		Nitr Lime	
Impure Pot Ashes	Dilute Acid green — consent to commence		Sal. Nitrum Impure Pot & coll. ed Acid — to the bottom	

Nor is it ever found in burning Vegetable Substances or any Juice of any Vegetable. Hence it seems exclusive naturally, and is only formed by an particular process & that is by the putrefaction, All Animal & Vegetable substances after they putrefie are decomposed have their Elements or rather Principles again combined so as to form Nitr: Acid. Hence we only find it where there is putrid Matter as in some Soils, and on the surface of Earth where Animal & Vegetable substances Nitr: & putrefie; Also in large Towns if Air contains much of it is constantly exhalling from the Bodies of the Inhabitants, Hence Stables Cellars and Walls in Towns may contain this Acid

But very little could be collected from all these Places so as to serve for those Destructive purposes, but it is apply it is accidental for one Place in the East Indies where there is a Plain is being putrid runs over the adjacent Soil.

It is also made in Germany in Manufactures into a Salt called Nitre & contains the Vegetable Alkali but as that Alkali is never found in the bowels of the Earth & only produced by burning Vegetables so Nitre can never be found Native in the Bowels of the Earth. It is therefore at first combined to the Vegetable or Calc: Earth and the Fixed Vegetable is added to it.

Nitre then consists of the Nitr: Acid & Vegetable Alk: our next Question is how shall we seperate from the Alk:

As

Antimony		
Wd Acid		
Cobalt	acid & diluted with 6 times its Wt of water Commun.	Sulphur Cobalti Sulphureous Sulph
Lead	Dilute w 4 times its Wt of water heat	Nitr Plumbi precipitable by Water
Tin	Concentrated Acid ~~or dilute the concentrated with~~	Nitr Stanni a Corrosion
Iron	Addition Dilute Acid or add Iron to a Soln of Copper.	Nitr Ferri
Bismuth	Addition Dilute Acid Water Communication	Nitr Bismuth precipitated by Water
Regulus Antim	Commun. concentrated Acid	Nitrum Antimonii a Corrosion
Copper	Dilute Acid Addition	Nitr Cupri
Regulus Arsenic	Heat	Nitr Arsenicum
Mercury	Addition Dilute Acid of 10 times its Wt	Nitr Mercurii Nitro calcined red precipitate
Silver	Acid part 1 Water p 4	Nitr Argenti Nitrated Lunar Caustic
Gold		Nitro Muriatic Solution incipient heat
Platina		

as we can't get it out from this Compound.

It is done either by destroying ye Attraction by means of Heat only or Electrical Attraction. The first Process is only to apply such heat as ye Acid being volatile comes over. But Nitre is easily melted & after melting immediately boils so that it is impossible that that enough can be thus applied to separate its Elements as no substance is capable of greater heat after it has Boiling Point, wh has its not here suffit to separate Elements, tho' yet two thirds of Acid is added wh we have seen bear greater heat & Acid comes over, but as this is yet expansive way, we don't need bring it in place

It may be separated better another way viz by an Electrical Attraction by adding of Oil of Vitriol wh attracts all Alkalies wch are Bases of Nitrous does wh is then separated from ye Vitriolated Tartar

Hence we pour Vitriolic Acid upon Nitre in a Retort & then distill.(1) The only Question is as to ye quantity of Vitriolic Acid to be applied to do this all ye Salty consist of Bases of Acid & Salts of alkali hence 33 lb of Acid & sufficient one Pound of Nitre. If we wanted it perfectly pure without Vitriolic we also quantity might be used; But if ye Neck of ye Retort is high & ye Acid concentrated none of it will come over. Care is to be taken in quenching wm of ye Potash

(1) If Retort should burst stop the hole out immediately

Menstrum

Nitre Acid	Earth of Alum	Addition of dilute Acid	Nitre Aluminosum
	Water	Addition of Acid to form a Salt	Dilute Acid
	Camphor	Addition of Concentrated Acid	Dissolved into an oil swim at top
	Ether	—	A Mixture of oil & smell of Ether is almost Caustic
	Sulphur	No effect	
Vitriolic Acid		Addition of concentrated Acid	Air Acid to inflammable vitriol
Muriatic Acid		Addition of Dilute Acid	Aq Regia
Fluor Acid		—	
Clay		mixed & Earth of Vitr. acid precipitated an alk. – commix vitr. acid diluted	Nitre Argillaceous ~~[illegible]~~
Crystalline Earth		precipitated from its solution by alk. &c	Nitre Crystalline

purified from Vitriolic by add. Nitre of Silver.

As a considerable degree of Heat is generated by the Electrick Attraction taking place; especially in the Cold Weather when the Heat is so great that it has been attended with a summer.

There is another Method of separating the Acid by means of an Electrick Attraction by adding some Metalline Salts as the Vitriolic Acid in the Aqua Fortis which will mean the double Electrick Attraction to take place but this method is not advisable as being more expensive than the simple Method. 1st. The Acid is so pure 2d. we can never ascertain its strength thoroughly so that we are generally deceived in prescribing it. Even in this other Method 1st we have the Acid pure from the Alkali yet as Nitre itself is seldom found Pure but containing Sea Salt, & Vitriolic Magnesia which come over with the Acid, for the Vitriolic Vegetable have both a stronger Attr. to Alkalies than Marine it comes over rather of the Vitriolic.

To purify it from both we first cast from the Marine which attracts all Metals stronger than the Nitrous, therefore Silver of consequence & since add Silver of Lead to the Acid & distill which will the Muriatic taking a substance insoluble in Water which therefore falls to the bottom in a white Powder. The same thing takes place with the Vitriolic Acid, so that if we add Nitre or Lead the Vitriolic unites to the Lead & also in a corrosion. But and is difficult to ascertain the quantity of Silver or Lead. It is

It is necessary to distill it over again. However by quantity of Strongest Marinated Reddish so small that this further Purification is not necessary for most purposes —

Shellac throws Red when gothic pure is always found except in some few cases where few Crystals have been found shining in the Neck of the Retort & a great degree of Fixed applied it becomes Black as other substances do, & remains Black till it is burnt to ashes with yellow Colour, & Water is added it becomes green, & in great quantities white and transparent. Some have said its colour depended on Iron or Copper being found in it, yet however we have no proof that it should not be brown as well as the Marinated is yellow & of Metallic Class. The Green colour was still lost owing to a quantity of Copper mixt, but it should not be green when concentrated as well as it is when diluted see experiments to explain this —

Its Specific Gravity when concentrated is much more than water it is as 15 to 10, but is not found the same Proportion, but we should always have it made so in order to proceed with a certain degree of Strength not Concentration. But in the Common Way it is found, perhaps a sixth part less or 5 to 6 Water. Its Specific Gravity has first made determine it and made it a certain rule to prevent Deceit, prevent Fraud in Trade, so that no mistake may happen to Place it in by it's Standard.

Its Smell Pungent & particularly great Smell, it

(a) [illegible] more [illegible] Quicksilver [illegible] together
red oxide, that is Turbith [illegible] Corrosive
Sublimate [illegible] into a Concretion, [illegible] a Salt [illegible] Mercurius
corrosivus precipitatus albus. [illegible] of Calomel [illegible]
when pounded. if concentrated Nitrous [illegible] [illegible]
[illegible] Mercury, [illegible] [illegible] quicksilver [illegible]

(b) Add Camphor the added [illegible] [illegible] into an [illegible]
[illegible] at the top —
with Alcohol it produces great effervescence and forms
[illegible] Aethri Nitrici

in distinguish it from all other bodies. Sulphur
is known to stand firmness to fire & in large quantity
and destroy any animal, were it could therefore be taken in,
with particular properties of sulphur & Alkali from its
corrosive & Volatile nature.

It unites with the different substances, as the spirit of
Essential Oils, and forms a Tincture which heat
with water will burst out into a flame especially if a little
Nitre is added. with Camphor and Salt of Tartar forms a large quantity of a pure colour
It unites with the Empyreumatic & Volatile Oils making them
all a solid, homogeneous substance.

It dissolves all the Metals except Gold & Platina & absorbs
the latter in a very inferior degree. There is this remarkable in the metallic salts made
with this Acid that they have less astringency than any other
Metallic salts, & yet they are more fixed & stronger. (a)

It unites with Fixed Alkalies making the Sulphur Vitriolatum,
with Magnesia, Vitriolum Magnesiae, with Ossium Vitriolum Aluminosum.

It unites with Phlogiston in many substances containing it
Dephlogisticated Phlogiston, Alkali, so that if Phlogiston
united with the Acid have this added the more
so to make an Ignis, or a particular Fluid called Deflagration
to distinguish it from Fire, takes place in Bodies given to the Atmosphere
& a great heat generated makes a Vehicle appear red.

In its concentrated state it dissolves all Animal & Vegetable substances, it first coagulates & then separates
the colour of the Fluids dissolved, Animal Juices, & makes them
into such a mass as the dry substances

Lect. 22.

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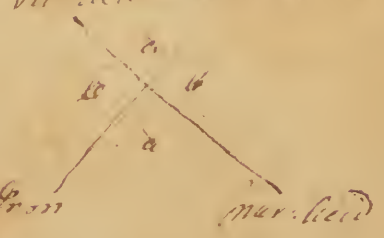
Fig 1



Extract of a Letter of the Marshal Aleid —

I having treated yesterday of the Acid we now come to the Marshal Acid, of the Harsour we got this found that Acid was so concentrated that it would make Glass by Fire as Glass.

The Marshal Acid is found most universally of any Acid in our Earth, the Vitriolic has been reckon'd to be the most universal but I believe there is not a square foot or inch of Ground but what contains it, it is found in all Animal Juices and some known in Juice of Vegetables, and in all Waters. In the General Mineral Bowels of Earth it is found in great quantity combined with the Fixed Alkali making Sea Salt, it is found sometimes in large Pitts. It is found Sea from 1/30 to 1/40 combined with the Alkali making Sea Salt. It is found also combined in Iron in the Bowels of Earth that is the Salt of Iron, which has been in the Mineral Waters, and not the Vitriol of Iron as have been imagined, if who will consider the Double Elect Attr. will find that this must be the Case for as Sea Salt is found small Parts of the Earth wherever it meets the Iron joined to the Marshal Acid decomposes it & the Iron joined to that Acid decays

Many have wonder'd why the Iron in Mineral Waters should be so seldom composed imagining it to be the Metal of Iron but when we know the Marshal Acid to be so Corrosive we are pleased, as it is the Property of this Salt to be so decomposed.

The Ingredients of Mineral Waters have been properly made by those who have done them

The Mar.

No. 26

The Marine Salts & Corporeal Lime would likewise may be found in Clays, as their substances exist in the Earth, either decomposed from the Lapis Plumbeus

Calcareous Earth & Magnesia are two substances so great like as to be found in this Clay as they always do longer than Metals, this probable they decompose the Metalline Salts, precipitating Metals and from where are so seldom in many springs, & the Marine Salts & Magnesia are extremely often to be found.

This thus go in the Combinations, that is necessary pure lying upon the Surface of the Earth are rare to Metallum Sudis often found Clay combined to the Vitriol Acid & Vitriol Alkali and it being so often is having produced in small quantity by Burning & Decomposition taking place in Vegetable & Animal substances therefore also produced this Acid Clay Marine in our Oceans owing to its being so easily dissolved by the Earth as of Stones.

Why Metals found joined to the Gallon making Metallic and as the Neutral Salts are decomposable by Heat in Volcanic Metallic, & the Magnesia Clay is set free and flies in the Atmosphere in Volcanic Vapors Vol is not easily kept, Metallic coming in contact with the mahogany Beats to prevent this the Metals are great care in drying any from the humanity Sense

I have heard spoken that the Surface of the Sea is acid in the Atmosphere especially about Volcanoes this is not impossible as it is indeed well Metallic

Mis

It is always produced in ye animal kingdom, as when the languishing fermentation takes place and all ye acids & water are either converted into this or thrown out of ye body. Hence this is found in animal bones but always combined wth ye Vol. Alkali with Sal ammoniac, never alone.

It is often found in Vegetables not being produced by their fermentation but in consequence of their growing near Salt springs, wch impregnate their juices with it. It is therefore particularly found in Sea Plants. Hence upon burning these Plants a particular Alkali is formed differing from that formed by burning other Vegetables. Lemery.

It is produced by burning, since it has never all boots contain it joined wth Vol. Alk. making Vol. Ammoniac and this from Roots principally that we get that Alk. the Vol. Acid is also generally by Heat.

Tho' this Alk. is so universal it is not native (tho' may be allowed of Depression) in Glass or in Vegetable of working into Coth. by accidentally.

Nature has it in great quantity joined wth ye Vol. Alkali in ye Sea & found at Potash, it from the ashes of Sea for Chemical purposes. hence it is manufactured in great quantity & Vol. cheap, Mahomet Prohibited their use separate it from its Combination wth ye Vol. Alkali in Sea Salt & not found Vol. Alk. & Calc. Ter. or Magnesia & are never get these in sufficient Quantities.

To separate it, we either destroy ye attraction by means of other superadding one of the Elements of Salt, or

(a) and to every Burgess and Burgess Wife and
Forrinn flyght is over to be said and Wthstood in Curia Dicte

or by an Elective Attraction.

It is worth remarking, that by heat alone destroy other Attraction we never can get the Alkali pure from the org. Vegetable, as from the Vitr. Acid in Vitre because as they must have something united with them in order that they may be capable upon detach, they or Crystalline Earth are added to it, or else that have expulsed the Alkali into a Glass.

Hence an Elective Attraction is lost. The Alkali is attracted by the Volatile Nitrous Acid, & of Acid by stronger humidity by of Muriatic. The Acid of Cochineal is so scance to be offended, but two acid of Vitr. & Vol. Muriatic, according and want of different Menstruum, and so we want of Menstruum Volatile Calcin. Vitre we use of Vitr. Acid in order to separate of Muriatic then of Nitrous of Nitrous Acid upon Sea Salt and let them digest a little & the Nitrous Acid unites with the Natron washed Calcine. Nitre which formed if not purified Portland will be as the Nitrous Acid is very Volatile, a part of it will come over with of Muriatic & make it by Rectification necessary.

The Vitriolic Acid we also use distinctly indeed. And in performing the Process we consider a great quantity of Water, and Muriatic Acid can never be condensed but in a considerable quantity of Water, And as the Fumes of this Acid are very volatile & Elastic, and don't Water alone. However but are particular Apparatus as P. Being a Retort with a very large Receiver, in it is a small hole with a Glass Tube in it with Terminalis

in a

278) [illegible] add Muria Selenitis or [illegible] Selin [illegible] should afford the distilled again

Menstruum	Solvent	Menstruum solution Concretions	Chemical	Neutralizing
Muriatic Acid				
Sp. Sal Gemm. Sal Marin Glauberian Fontan.	Sp. fixed Alkali		no Effect.	
	Volatile Alkali		no Effect	
	Animal & Vegetable Alkalies	Corrosive Acid	Deliquesces in Oil & Brown Mass	
	Mercury	Corrosive	Sp. Salis Dulcis	
	Fixed Vegetable Alkali	Addition	Muria Kali Sal Digestivus Sylvii	Magnesia
	Fixed Fossil Alkali	Addition	Muria Natrosum Sal Gemm Fontan Marin Common Salt Barilla	Magnesia
	Calc Earth	—	Muria Selenitica Lime Shell or fixed Ammoniac	
	Vol Alkali		Common Ammoniac Muria Ammoniacale	
	Magnesia		Muria Magnesia	
	Zinc	Addition	Muria Zinci	

in a Phial of Water fixed upon the Tiders mid stand.
& that such of Nitrous Acid as would not con-
dense in ye Receiver goto into ye Water & condensed
& when this Water is saturated we place another that
takes place till mean wd Tider.

To perform this Operation to every Pound of Sal
Nitr we add 3q of concentrated Nitrous Acid, first reduced
to more than twice its weight of Water, especially since
we n ye Operation go on easily if ye Acid not very con-
-centrated, but if we want it concentrated we use Equal
quantities only of Water & Vol Acid. Some have ordered
the ~~salt water~~ salt distilled, but that is unnecessary
as its only driving off ye Water & having less more
We need not be solicitous in pouring ye Acid
gently upon ye Salt if ye Salt has been brought in
dry'd as not much Heat is generated.

On this Operation we see a particular lying enclosed
closer than common one, they mix'd in ye Nitrous Spirit
Eggs & then this coagulated by adding a much less Water
than ye appointed Vitriol as we would any other Liquor.

By this means we get the Acid Pure only mixed in
a considerable quantity of Water, without it we would
always have it tinge Water of a Green, it is a consequence
a Fluid Thinness, its yellowish, but if Colour is wanting we
allow iron added twice or extracted from ye Lutings as the Clay
generally contains some Iron, besides that it is a little Yellow
of itself, but a little Iron makes it a deeper Yellow. In this
Spirit the Dr Spirit decomposed, and did not a strong menstruum
as shall be said hereafter, that
Sal or Calc of Vitriol

Menst[m] Murias Acid	Cobalt	addition of dilute Acid	Murias Cobalti
	Lead	Addition concentrated Acid Communition Boiling Heat	Murias Plumbi Plumbum Corneum
	Tin		Murias Stanni
	Iron	and if water is digested in heat	Murias Ferri when if Acid is not saturated — The Martial Ferri in ff state — care to avoid oil or dilution
	Bismuth	first dissolving if Bismuth in the Nitr. Acid, afterwards precipitating it by a Muriatic	Murias Bismuthi
	Regulus of Antimony	By means of a double Mechanstruum lechoeri Antimonii Murias Mercur. & this to my state of vapour by distilling them together if Regulus Antim commover wth a Muriatic Acid.	Butter of Antimony
	Copper	(a) By first dissolving Copper in the Nitr. Acid & precipitating it by Magnesia. or by precip[t] Nitr cupri by Muriatic.	Murias Cupri. hole if slaining Mag[a] green. perhaps w[ch] do if same to Iron
Reg of Arsenic		by D[o] precipt[n] or (a)	Murias Arsenica

that other Properties Acceptance Reflection, colour & Odour were
wanting that these cannot be more considerable, but
I found out at last that this was a Gas.

Although Nitrous fumes in our Atmosphere when at
rest concentrated, yet it is not least volatile, but its
fumes seem to depend on its easy solubility in the air
& not to its volatility.

The Greatest Specific Gravity is as 12 to 10, we can
not add it more on account of its being so sufficiently
condensed. So far for its simple Properties now as to
its Effects on other Bodies —

It deflagrates all Alkalis making & Salts arising Salts
& dissolves in different Earths.

With Calcareous Earth makes Nitrum Selenites, or
Liquid Spirit which has been used as a solvent and Stone

With Magnesia makes Nitrum Magnesia

It is also capable of Combination with Earth of Alum
which Bergman called Earth of Vitriolic Acid that
Earth in deflagrating with Vegetable Acid.

Also with a good Clay is deposited in the Alkali
& then precipitated by adding Vitriolic Acid & after-
wards this to deposite the Precipitate.

It not to be easily combined with inflammable
substances, Combustible Bodies & has only the Effects
destroying in Combination & is concentrated & mixed with Water
Chalk, & Nitric Effect on Essential, Empyreumatic or Inflammable.

It is capable of dissolving the Metals.

With Gold it makes Chrysum Corrosive in this
made a particular use Dyers use for obtaining
darkness —

With

Mensis Mur. Lied			
	Mercury	By dissolving it in a Spiritous Acid & then precipitating it by a simple bitter Vegetable & Fixed Alkali then subliming it	Murria Mercurii Corrosiva Sublimata
	Silver	By dissolving Silver in a Spiritous Acid & afterwards precipitating it by a Fixed Alkali	Murria Argenti Lunaris Corrosiva
	Gold	Not by Fixed Alkali ~~or by Fixed Alkali~~ ~~& by Fixed Alkali~~ ~~& digested in heat~~	Murria Auri
	Platina	also by heat & in Concentrated	Murria Platinæ
	Earth of Allum	Fixed Alkali	Murria Aluminosa
	Water	Fixed Alkali	Dulcis Aqua
	Camphor		no Effect
	Ether		no Effect
	Sulphur		
	Vitriolic Acid	Fixed Alkali	
	Vegetable	Fixed Alkali	
	Air	~~[illegible]~~	Murria Argilla by precipitating Argilla from Vitriolic Acid
	Crystalline Earth	[illegible] by [illegible]	Murria Crystalli

with Silver makes a Lunar Cornea, & Perlan-
-ency Butter of Antimony & Copper & stained to
a fine Purple & a fine colour but for this purpose the
first to be dissolved in distilled Acid, then precipit-
-ated & thus added. with Cobalt it makes a Sympath-
-ic Ink as all the Salts of Cobalt do —
It is not capable of dissolving Gold or Platina
unless alkaline Spirit of Acid is added
It has no effect on Sulphur.
With oil of Vitriol it does unite, but no perfectly as
either to make it non Fuming or destroy the
burning quality of Alcohol.
This shews its greatest attraction for all the Metals
and next its greatest for Alkalies & this is only change in
the Table of Affinities for Metals & Alkali & shewed that it
stronger than it does such it attracts Metals stronger
than they.
It dissolves all Animal & Vegetable Substances
except Silk & coagulates their Juices of Animals &
concentrated before it dissolves them & leaves the Fibres
It is upon this Account Valuable used in Anatomical
Injections, as it does not dissolve the Injection itself.
The Injection should be perfect neither too stiff nor
too fluid. The Acid solution applied hitherto in Juice would have
the Preparation perfect & complete for if used too strong
would coagulate the Animal substance that the
Preparation would be rendered before we could wash this off
the Acid must therefore be diluted & then must gradually
work forth Corrosion. The Acid as got in Abbot Snow
shows Acid &c in 8 ounces to weight of Water Let

Acids. — Vegetable { Acid Salis
Distillatum
Ferment { Acetum
Tartar.

Animal { Expressed — as from Ants
Distill'd, (a)
Phosphorus (lately cov'd by Margraave

uncommon. Mineral { Acid of Borax
Amber — Salt. Succ. some from Pit Coal
Arsenic — as the way metal makes white Arsenic

(a) The Distill'd Volatile comes over in ye latter end of Chem. Analysis according to Homberg but in our Com. Exp. to be united to ye Vol Alk.

No. 4

This differs from what has been called by Chemists Calcination, meaning a separation from a body, by which its properties are changed.

An instance of what they call Calcination we have in making Lime, where upon casting of stone or Chalk to fire there is a separation of the fixed Air & Calcareous Earth, or Lime Calcareous.

But in our Calcination we have an instance in Lead wch gains a considerable weight from ye Air & Fire so that 100 of Lead will make 600 of Calx & upwards.

We shall therefore call that Calcination where there is an addition, and where there is a separation we shall call it Burning or Roasting.

In Calcination (strictly) we can always prove there is an addition, we can't say what the addition is or wch of the Elements it is that are added. Some of these shall speak hereafter when we come to treat of Fire. We shall endeavour to guess what we don't know to a certainty, but this probably an Acid wch is combined wch Other substances from ye Air.

Calcination has been by Chemists confined to a few Bodies viz Tin & Metals only, but many more are subject to it. Lead, Copper, Iron, Silver & Gold calcinate by Fire; it is made more or less Calx. The Vegetables have been subject to that known Earth generated, all these are capable of Calcination, an Earth being left behind, and that may by repeated Distillations be totally converted into Earth.

Mechol

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Alcohol is also capable of it, so is Water, in short all the Chymic Principles have been thrown by Chemists to be so. Mr Mangrave particularly shows how Water is capable of it for in one Machine in Holland for Moon Water or Spirit of Wine, the Water is changed into Earth, but by Fire but if Wood or Vegetables often changed in the Medicine they are so split & cut.

Whether or not Metalic substances are capable of Calcination we can't say, as we have em only in a state of Vapour & if we could get em in any other form they might perhaps.

We have said that this was always an Operation for Combination and this we can prove by the increase of Weight, But we are not certain whether there do not also Fixation also take place, and if there is this probability if so not substance, i.e. in integrant parts, ~~therefore~~ in the Flowers to fly up from Fire if rapt are again convertable into Fire in a Metalline form exactly as it was before calcin'd.

Cables were said to be made by a Calcination of the Paloa, on only this may perhaps be the case in some but in others we find that by an increase of the same Heat without adding any thing we can reduce each to their Metalline form.

It is not always absolutely requisite that Bodies if solid should be rendered fluid before they can be calcined. Some of them as Copper burn more easily calcined when solid, but we see upon exposing it to a considerable Heat, if outside calcined without being melted & this Calx falls off if cold or thrown into Water.

Mr

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Most Bodies in Calcination require that the Air have a free access to them, as it is probable from this that they require this addition; particularly Metals require it, tho' Mercury is an exception to this. Lime we saw required it —

This Operation is generally performed on Metals either to change the Metal into a new substance, or to separate one Metal from another. As this requires the Air to have access to them we should do it in a shallow Vessel, melting it under the Muffle in the Melting Furnace applied a proper degree of Heat —

Sometimes however it is necessary to blow Air over the surface of the Metal while calcining, particularly in the large Works where in the converting Cast into Wrought Iron a constant Blast is applied to the surface to blow the Calx as formed to one part of the Vessel, this afterwards taken out & put into a Muffle & carefully stirred in order that the Air may be admitted to every part of it.

The next Operation is Vitrification which is of least of those for Combination.

It is such a Change produced upon any Substance that upon cooling after being melted it changes into Glass instead of the same substance it was before.

Thus Lead exposed to a great Heat upon cooling don't turn to Lead again but into a different substance called Glass.

This Operation is performed for Addition, for no substance was ever vitrified, nor can any substance have its properties changed but by Addition & Separation.

Air

As no substance is of itself vitrescable yet are by addition and many require first to be calcined of Earth. Crystal Earth is not of itself vitrescable but is by an addition of 3 parts of fixed Alkali & then makes our Common Glass, so also y same Alk: fixed with Earth or Calcined of Metals soon vitrifies them, applied to y Inflammables as Oils reduced to Calces it makes them flye so also in y Metals. Gold is the most difficult to be vitrified yet may allow 4 to 20 parts of Silver but neither of Metals tho' y reduced to Calces but by an addition.

This Addition is generally of 2 sorts. Either of something else to y Substance as in Calcination or of 2 or more of y Chemical Elements together. If the first we have an Instance in Lead wh if steel alone is applied is changed into glass & of the other we have an Instance in our Common Glass where Alkali & Calcar Earth are handled to compose it.

Vitrification is performed for 3 different Ends. 1st for y Glass itself, as by adding an Alkali to Crystalline Earth to make our Common Glass, & y whole is done by applying them to a proper degree of heat.

The 2d is for y Seperation of Earth from y Ores of Metals called Cleaving. 3rd Lead Ore we often see an Earthy Substance called Quartz and

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and in order to separate these we add some
Menstruums to dissolve 'em and these substances
are called Fluxes, of least sort of wch is some of
ye Metallic Calces, next to which is Borax and
Nitr Gypsum Selenites & Tuscable, yet are the
most Common But in small Operations we use
Fixed Alkali & Borax wch are rather preferable

The last end for wch this performed is to
separate the Baser Metals from Gold & Silver
it being a difficult matter to vitrify either of
these, it is indeed almost impossible by Salts
alone to vitrify Silver and this absolutely so
with regard to Gold. These we put into
what is called a Paletta Coniciatorie, or
in English a Cupel. hence ye Operation is
called Cupellation

Coepit 15

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Lect.re 15th of Seperation.

Having shewn the different Operations which take place in Bodies when they are exposed to Combination we come now to shew for Seperation

Seperation is performed by
- Reduction
- Precipitation
- Solution
- Evaporation
- Burning or Roasting

Being in all only 5. the first of which we have alreadyed to be an Operation for Seperation, being fully determined from Experiment that this Cop.r Copper is reduced into its Metallic state from a Calx without any addition, & only by the application of a great Heat. Hence it is probable that the Phlogiston required in becoming a Calx is separated & driven off by the great Heat. and the Copper is reduced without adding any Phlogiston tho we have as much proof of Copper containing Phlog.n as we have of any thing else. Therefore we think ourselves sufficiently authorized to say this an Operation for Seperation.

Reduction is therefore a seperation of something acquired from the Calx by means of adding Phlogiston.

Exp.t Wafers consist of a considerable quantity of Lead in the state of a Calx mixed with an Animal or Vegetable substance containing Phlogiston, & they are exposed to heat (as a candle burning) the Phlogiston or matter of heat acquired by calcination & the Lead is brought to its original form.

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The same happens upon exposing Red Lead to Heat in any Phlog.n in a Crucible, it will be reduced to Lead, but less in weight than Red Lead was because of Lead acquired in Calcination in acquisition it has lost. 1000 of Lead upon calcining may weigh 1050 but if reduced to Lead it will be nearly 1000 as at first the other ten being separated by Phlog.n added.

Again if we take 4 Calces of Gold & Silver and reduce them to Metals without adding Phlogiston they loose of their weight.

To Reduce Metals then we have only to add an Animal or Vegetable Phlogiston, whether the Metals do or not do not yet determined, but an Animal & Vegetable Ph.n does, as we saw in the Charcoal made in the Minium & a little Oil was an additional Phlogiston easily reduces it whole, put into a Crucible & exposed to Heat. And this has been whether in Close or Open Vessels but a free access of the Air tends promotes it much especially if a Blast of Air is blown upon it, which is a strong Proof that if same means should both promote Calcination and Reduction as it has been shewn by taking the Crucible out of the Muffle & blow upon it with the Bellows. There may not this be by the increase of the Heat by the Appr.n of Air. — This then is the first Operation for Operations, viz. the Separation of the Matter acquired in Calcination, it is called Reduction. — We next Comit. the Process.s Reasons

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The Precipitation Humida or dry precipitation is analogous to the Humid Precipitation

It is the seperation of the Elements of a solid compound, by means of a solid Precipitate and a fluid by means of Heat. In this it is also similar to the humid in that one is made fluid tho not both indeed as in the humid, one being sufficient here.

Exple. In order to seperate the Regulus of Antimony from its Sulphur and Antimony, by means of adding Iron we must first make the Antimony fluid & then Iron added unites to the Sulphur & the Regulus seperated remains fluid by itself. It is here a Corrosion not being soluble in the Menstruum it is the former Corroded was. Thus the Precipitation Humida & Humida differs from the Humid, being obliged to make one of the Bodies fluid that it may act upon the other. This Operation has been performed only on a particular set of Bodies being the only ones and we work much otherway.

It is generally performed either for seperating Metals from their Ores or One Metal from another that Lead Ore consists of Lead & Sulphur to seperate them we make use of Dry Precipitation by adding the fixed Alkali with under to the Sulphur and the Lead is precipitated in order to keep the Lead from Calcination we add an Animal or Oily Bodies the Removal is therefore to be put on them

Another way of Dry Precip.n is found seperating of one Metal from another as in a Mixture of Tin & Lead, &c

§15. So to which we add Sulphur it will unite with it & Lead and the Tin will be precipitated.

The 1st use of this Operation has caused the terms Precipitant & Precipitate to be changed into that of Flux & Regulus. The Body which we add is called the Flux Precipt and that which is precipitated is called Regulus or Precipitate. The Fluxes have been distinguished according to the quantity of Phlogiston, and denoted by different names. Thus a Black Matter is called Black Flux, but when the Fixed Alkali was used alone without any Phlogiston it was called the White Flux.

The Dry Precipitation of Precip is called Regulus & was first taken from Regs of Antimony & has a star added. Hence all Metals of Antimony is called Regulus, hence also Regulus Arsenic. All Metals are called Regulus when new got from the Ore, & the Compound Metals remaining is called Scoria.

But when the Precip is performed for the Sepn of one Metal from another, we use the term Precipitate for the Metal separated, Precipitant for the substance added, and the New Compound is called Scoria. As to separate Gold & Silver we add Sulphur & unite it with the Silver & the Gold is precipitated. Hence the 3 names applied are Precipitant Precipitate & Scoria.

We next come to Liquation.

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Liquation is the Separation of two solid bodies in a compound from one another, by applying an apparent heat to melt the easier only & not both.

This method already shewn and have but little more to add now. It appears in a Muffle &c

It is used for separating Sulphur &c from Ores & heat is applied to melt it Sulphur is then run down and refined Pan into large Vessels.

The last Operation is what we call Burning or Roasting tho' have improperly been called Calcination

It is a Separation of two Bodies in a compound by destroying the Mixture between them by means of heat & applying such a heat as will evaporate the most volatile.

Thus if we take Chalk and expose it to Heat & Fire this is driven off & Chalk becomes Quicklime has been called Calcination but improperly, tho in Calcination there is always an Addition.

Altho' Burning & Roasting be entirely different from Calcination, yet Calcination often takes place in this Operation, tho if we apply Antimony to great heat & Sulphur is not only entirely disengaged but the regulus not only is burnt but Calcined also becoming a white Powder.

Thus all Separations of Bodies fluid in a great degree of heat are either for Combin^n or Sep^n

Fixed for Combin^n are &c

Therefore Separations are in the legal of the Lecture.

Next to

Lect. 16th. On the History of Medicine & of Medicines & of the Human Body.

We shall now proceed to give a short sketch of the History of Medicine, & what is of most difficult part of our Course, endeavour to account for the Actions of Medicines on the Human Body. So far as in our Power as Experience has carried us we have been observing & tracing, but in this part we have many Depts. undiscovered & not formed into any Regular Action, and of many things now is unknown this w. a degree of shewing the Infancy of our Present System.

Medicine said Lord Bacon is of all the Arts the least laboured, and the least understood for what has been laboured — All knowledge proceeds from Experience; all in regard to Matter mind proceed from what is generally called Experiments; all in regard to Mind from Observation of what passes in our Breast.

Medicine may be considered either as an Art or Science, either merely and Art of removing Diseases, or as a Science understanding the Laws of the System and then applying proper Medicines to relieve.

Medicine had its origin like other Arts & Sciences thus first from a Number of Facts & Experiments and this was all till the time of Hippocrates. The way in which it was prosecuted was generally by the Priests of the Temples where Cures were put up & the sick of Diseases related, these also were told to People who.

who made it their business to see it by the light
were to people afflicted wth Diseases, it must there
fore have been in every rude state at that time,
But at Hippocrates time Experiments affording him
much knowledge clewed each wth its opposite, pointing
out a way to true knowledge, tho' a rugged path indeed.
but it seemeth to be as easy by every one desirous
of obtaining a true knowledge of the Profession
But if Blind Chance being restless, & succeeding
Ignorance would account for every thing, this
has indeed been certainly true but more
especially in Medicine, Hence we have been either
wholly inclined to Stoicks, Stoic Systems or Empyri-
-cisms. But if Hippocrates's method had been
followed to this day, we might probably have
arrived to a certain knowledge in Diseases how
to cure them or whether or no they could be cured.
But after him there arose a set of Men viz the
Dogmatists having Galen for their Master, who
introduced certain Hypothesis's and laid the
foundation for many Errors, but this System
soon overthrew itself, and People again beginning
to make Experiments as before of Hippocrates
was succeeded by the Sect of Empyrics. But it is
impossible that a Sect of Empyrics can last
long as they must in time be collected their
Experiments from a Distance, hence must soon be
overthrown. And this now decays, the Laze, and
those again succeeded by the Eclectics of Galen,

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who pretended to account for all Diseases from an Excess of a Salt & Quality in the Body. The Wealthy practised upon the Knowledge which the Empirics had gained by their Experiments and form'd an Hypothesis to wd now appear ridiculous.

Should such a Disease happen, because the Body was heated or cooled one, two, three, or more degrees from its natural state. Should also the Medicines applied to Body heated or cooled in the 1st, 2d, 3d or 4th degree, and these be applied accordingly, viz. a Medicine in heated in the 1st degree to a Disease taking its rise from a Body being cooled in the 1st degree.

This gain'd ground over all Europe till the Barbarous Nations rushed like a Deluge, and destroy'd every thing. But some of the Greeks & Italian Physicians practised among these Barbarians who themselves were unlettered & who reckoned the Physicians Gods. They spread amongst the Barbarians the Doctrine of Galen, and when the Arabians began to begin let themselves go back to Europe, when the Christians arose, and the whole Galenical System was overturned by Paracelsus a very ignorant & young Man, but understanding Chemistry & cured many Disorders by Mercury wch had baffled the Galenists, who now begining to grow learned and sparing in the Dose of Medicines having forgot the Experiments on which their Notions founded. Paracelsus despised these learned over all Europe cured many killed more, but excusable & Illiterate, overturned & Galenists, and

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and introduced a Chym of his own, a Chymical one viz, accounting formall Diseases from Mercury & Tartar, & other ferments in some parts of the Body.

Van Helmont his disciple a sensible and learned Man, judging properly of the Galenical & Paracelsian Systems, ridiculed their Theories, but advanced himself an Hypothesis equally ridiculous.

He said a Spiritus Archeus Nature ruled in Body and that Diseases no spirits as Enemies & Territories of this Archeus who fought 'em and drove 'em out, whom he made it so probable & satisfactory that he got all Europe for his followers and to this day same is embraced in Germany Italy & France, tho added that Archeus fought like Leathers drove out Diseases or they overcome him pulling him in her Capital.

In France & England this was subverted for at this time a Mechanical knowledge was introduced into Physick, by wh they accounted for Action of Stomach Digestion &c, reasoning thus as fibre of one grain weight & ounce of 8 to fibre of heavy weight is raise 8 oz. & that Discovery & the Operations of all Medicines were accounted for by this means. Such a Doctrine is now of most universal in England France Holland, in Spain indeed they are noisy Empyrics

These Men are of two Sects wh almost prevail. Those wh follow Van Helmont and his disciple Cartesius who say all Diseases are to be cured by assisting Nature

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The Mechanics whose say all Diseases arise from a wrong Composition of Parts of the Body.

There is another Sect which has long been creeping into Physick, a Sect that don't account for Diseases being cured by Nature, or Fermentations but Mechanically like the Mechanics. But endeavouring by a collection of particular Effects in a number of Bodies have upon ye limitated part of our System and the proper application of these to take effect on contrary to that they have and Am[illegible] Dr.

Ex. Gratia. From observation they have found that Pain in often happens to a Animated part of our System, is removed by a Pain applied to a different and Tooth ache by Cauterizing the Ear.

This has likewise spread thro' Europe but only in a few hands, for two men observed their most famous Physicians amongst Moderns have been of this Opinion as Willis, Baglivi & Hoffman. They proceed upon General Laws in they have found take place from a collection of Experiments, such is if only Medicine can be cultivated to advantage. A Physician should know all ye Affections of the Body & without any fear prescribe Effectual Medicines. For Blank is deservedly supposed to be good in Scrophulous affections &c, this we can't account for from Mechanics but know it from Experience the Teacher, We also know that if some Medicine given to a quantity of Oz once in an hour can have no effects But

But if given to a quantity of it in that time and continued for some days has excellent effects
Hence a Physician should not only know the affections of the Body but be a bold & resolute practitioner
We shall now come to a more particular account of them.

The Mechanical Philosophers suppose, that diseases and Pains are no consequence to Medicine but Diseases happen on account of some Redundancy of Solids & Fluids & that Medicines are applied to remedy these. As to their Physiological Inquiries, they suppose the Food to be macerated in the Stomach, digested & fermented there, and after that being taken into the Blood Vessels by the Stomach itself against their Sides, is changed into Blood being also made into Round particles, which they suppose sufficient to constitute the Blood.

Thus Schuline supposes the Corpuscles sometimes to be rigid & sometimes lax, when rigid the particles of the Blood must in consequence congulation and are formed into a firmer Coagulum, but when it don't meet in enough to thus it settles into a lower coagulum in the nature of Coagulated Blood in opposition to the other in its natural state.

In the Anophyllated state of Vessels being rigid as they suppose the Blood is thrown in violence produces Inflammation by getting into a Conical Vessel where it stuches, dilates its bigness upon its neighbour in it also obstructs & thus upon the other the Circulation is stopped in a Vessel of a Limb perhaps they

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They likewise supposed the Globules of the different liquors were of different sizes, and if one of that Blood acted to a certain Vessel stopped, an Obstruction merely ab Errore Loci, either happen: from its viscidity as we said before, or of the Vessels were lax and not sufficient force to push on the Blood through the Vessels which it could pass before, they became also obstructed, but then no Fever or Inflammation ensued. They likewise supposed that Medicines acted by thickening or thinning the Fluids.

The Fluids they supposed were thinned two different ways, either by adding a quantity of Water to dilute them or by cutting them into pieces but the latter can't take place in Fluids. Again to make the Vessels lax or relaxed they supposed Medicines hardening, and that on our living Bodies as they have opened dead. E.g. as Alum makes a piece of Dead skin hard tryed on them imagined it would the Livers and that they were relaxed by their Liquors as a Bladder is made softer by cleansing

To illustrate what we have said we shall take a Medicine of Mercury, it is apt in proceeding from an inflammation of the Pleura or Diaphragm or internal parts of Thorax.

The Followers of Boerhaave explained this by saying that the Blood was become viscid from some cause or other and therefore to obstruct those Vessels it could pass before, & those preying upon their neighbourhood obstructed them also, and the Fever was raised thus, and

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and said that in all Inflamatory cases the effects were considerably altered, and moreover the intention of thickening & thinning of Blood they used such Medicines as they thought fitt these Facts. in the ~~Th~~ where a list of these is given, & by Blood-letting they proved that a quantity of Blood taken away promoted & then & minded the Pulse.

They were otherwise ~~to account~~ perfectly at a loss to account for this Disease, but Sydenham's Doctrine being raised from Circumstances attending Inflam^n & however can't be applied when Inflam^n & Barthaque have been considered, & when upon any other disease applied this formula very invalid & factorings as we see in the Hysterick Disease.

The 2d System or that of following Nature took its rise from Van Helmont. By the name they mean a Spirit over watchful over the Body and confine themselves to find out what steps nature takes when left to herself & they endeavour to follow, so that instead of being Bold & Inventive they are observers only, and give far Medicines & those friendly, & their whole Care is to keep the Body from being irritated while Laboring under a Disease hence Bleed in a Plethora, purge when Costive, give Vomits when my Stomach is foul. This Doctrine is contrary to that of the Mechanics who pretend to cure all Diseases by mending the Solids & Fluids, but those from Hartel don't pretend to cure any but only prevent Nature being diverted from Caring. Thus Dr Pleurisy says thus Nature has incurred Morbific

Matter from

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on ye Vessels of ye Thorax & endeavour to discharge it thus; hence give Expectorants to promote ye spitting & open a Vein to prevent too much Blood flowing against ye Vessels occasion Pain, but there from shall say don't Bleed unless ye Pulse is high, lest you counteract Nature, but give Expectorants. Both ways perhaps will cure equally well, whether Bleeding be left to itself & only Expectorants given, yet that ye Spring Deluder Legions of Empirical Medicines would seem to be attended wth less danger

The last Sect proceeds in a different Manner vizt by Comparing a number of Experiments together and endeavouring to find out ye Nature of them & similar to each other. & yet a number of different Disorders only wherein ye Part affected, ye inflam^n requires ye same treatment whether it be ye Pleura, Lungs, &c. We endeavour therefore to find out some general Effections and certain Methods of relieving them that we may practice when they occur.

This we shall endeavour to shewn in attending to a Pleurisy the Pulse shews it is Inflammat^y and we know that certain Medicines will relieve an Inflam^n, 1:ly notany thing ye^h empty the Vessels as Purging ye^h empty the System in general & V^sis^n empties ye Vessels in particular. We know that Bleeding in a part near ye Inflam^n ye^h only affects some particular Vessels, has a better effect than a distance ye^h only acts by empty^g ye System thus will relieve when ye latter will not. Pain

Pain applied near a part removes that in ye part already as we have formerly proved. hence Blisters to ye part of great use. But first

Let Sacro [illegible] in order to empty the Vessels suddenly & ye whole of em in order to remove ye Inflam.n & we suppose depends upon an affection of ye Immediate part. & to prevent any ill consequences from ye too high Inflam.n

Any Irritation and Bowells from a Costive habit or a sponge Stomach we know always increase ye Inflam.: in any Pleurisie therefore endeavour to obviate the first cause Costiveness & ye sponge of the Stomach by a gentle Emetic, but if ye Pain is very violent, we would take care not to hurt that by forcing a Vomit, but give Gentle Clysters to prevent an increase of Inflam.n from ye Irritation of Excrements.

We know that all Inflam.ns are relieved by throwing in Warm Water especially in ye Virgin & the hence give Diluents to promote ye Cure.

Having this removed it from ye System, and any Pain remain in ye particular part we would then apply a Blister as near as possible to ye part.

For we know that if we apply it to some other part it will hurt ye Disease, as Pain always increases Inflam.n in some measure, & however a Pain in ye part is overall. mitigated by its good Effects but ye contrary at a Distance.

Lastly

Lastly we know that Feverish Complaints are lessened by certain Medicines, as Emetics given in small Doses, viz. Fever remains while give Antimony, Bottle snake root &c.

There are then 3 principles by all of which this Disease may be cured, viz. Mechanical, Chemical, & Physical.

In order to explain the Systems we have advanced we thought it as short & easier will permit, we should observe that the Living Body depends upon 2 Parts; 1st That Part by which the Body moves, & 2d The Fluid which supplies & Machine. Suppose a Man bled by Fumes of Vitriolic Acid this only this living power is destroyed & the Machine remains the same. Yet clock thô remaining of same parts still can't move if Weight is removed. Now the Human Living Body is subject to certain Rules & Regulations or Laws.

1st This is a Law that an Irritation applied to any part causes off one in another part. Also

2d A great quantity of Blood is carried in the Lungs there is lost in Thirty Minutes &c.

Now these Laws do depend on the Body's consisting of Arteries & Veins, as being an Hydraulic Machine, & this seems impossible to account for on from Mechanical principles. &c.

Pain is removed by an Irritation applied near the part causing a Counter Irritation &c.

The Cause of Diff.n has been endeavoured to be accounted for from Hewlson's 2.d Sec. & scheme above. Let a Bean obstructed Artery b be a communicating one, & two an opening be made at c, yet b will still be filled from D as well as a. b, but not cut by reason of lost power Vis in a liquid body whereby one stream being interrupted removes an irritation air another before produced

it has bugled the Mechanics Accounts, they have thrown Revulsion, but have disagreed whether of Revulsion should be made round, or at a Distance. There is such thing as Revulsion certainly. Yet in an Inflam^n of the Eye of Patient may be bleeded to Death without of Inflam^n abatement, if we make of Evacuation at a Distance but if we bleed near of Part it is easily relieved. Now it is impossible to account for this from of Effections of the Circulation of Blood, Another we say it is the Blood drawn against the Effects, then take Blood from the Arm of that will open of Quantity, that of Blood is supplied from Neighbouring Vessels. Besides it happens often, that a Revulsion is applied to Vessels wch don't communicate wth those affected of Inflam^n over and Pain rain the Blood of Vessels of Dura have no Communic^n wth those of of Calvarium and of it was only a Pronaccount of employing the Vessels affected of might as well bled one on the Leg and of Breast.

These Laws must c'em all laws [illegible] upon, [illegible] or Vero Power, wch of destroy'd they are also destroyed, as suppose of Breast and Parts lie at water two wch have no Effect on of Brain.

The Living Power [illegible] perfect of Body is well but if hurt in any part that part is destroy'd [illegible] contrary wth of Machine by a leg is cut off of Body may remain in perfect health, so

so in ye Lungs half of 'em may be destroyd without ye Patients feeling much, from any hurt of ye Machine. But ye least affection of ye Nervous Power is always found to bring on a disease, as a Person being in low Spirits becomes weak & subjected to Spasms. The Machine is perfect, but ye Nervous Power be destroyd, ye ye Catholick Acid.

But it often happens that hurling ye Machine induces Diseases, as if we cut or bruise any part but this only happens by over loading ye Nervous Power tho ye Machine but this wound is only ye beginning of ye Disease & tho ye offending instrument be removed ye Disease of ye Nerve still goes on, & as this wound happens to a man that has drank much Wine, or just taken a large quantity of Opium, we shall have no Inflam^n but ye Pt shall dye without any Inflam^n as we often see in our Officers who take wine & going to Battle ye Surgeons take Opium. The reason is that ye Nerves are not after that sensible to ye irritation, wch won't now produce such an effect as Inflam^n. But if these Medicines were given before ye Wound, yet would increase ye Inflam^n very much.

We shall now come to ye second part of Medicine, viz. The Application of proper Remedies to remove ye Disease.

Medicines are such substances as applied to ye Human Body take off ye weakness, & have proved that all Diseases depend on some affection or other of ye Nervous Power. All

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all Medicines must act in their affecting ye same Nervous Power this every one allows.

Ye manner how two ways —

1st By immediately affecting ye Nervous Power

2d By first affecting ye Machine & ye Nervous Power in consequence. We shall first consider whether Medicines act upon ye Machine and afterwards ye Nervous Power.

Ye they act upon ye Machine it must be by affecting either the Solids or ye Fluids that compose ye Solids, hence ye change must give the produced on ye Solids. We shall proceed to prove that it is impossible to alter ye Fluids that all ye Change that can possibly be made in them is only in regard to their perfection or imperfection. This is evident from ye Laws of Fermentation & being evident that no Dry Substance can ever turn Blood in ye stomach or intestines of ye Stomach. For all Vegetables are changed by ye Stomach into a uniform substance, as we see the Juices of all Vegetables are finally turned into ye same Sugar tho' ye juices were of different Natures, so in ye stomach however different ye substances are thrown in ye whole is changed by ye sanguineous Fermentation into ye same Blood, and should differ as little as it undergoes several different Fermentations before it is changed into Blood, viz first ye Chylous then ye Gelatinous into ye Serum & then into ye Blood, and we cannot imagine that a Medicine undergoing all these fermentations endeavouring to convert it into a substance similar to themselves can remain what it was at first, by — Besides

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Besides ye Quantities of Medicines y^t get into the Blood are so inconsiderable that it cannot happen that it should be by any change on ye Blood that they produce their effects. We offenses the Blood in Ulcers changed by ye Patients taking 2 oz of the Bark, and we know that ye Blood must have been changed before this secondary Secretion could have happened besides perhaps only 3 oz of ye Bark have taken effect & how ridiculous imagine this should make any change in so great a Mass.

But there are other Medicines y^t act in little Quantity & y^t cure will yet salivate a person for 2 or 3 days and how can we immagine that one grain could so thin & corrode masses of Fluids as to produce this effect.

Another thing is as to ye time they produce their effects many acting before they can possibly have any time to affect ye Blood as Vol Alk^l will immediately purge in many cases.

Also in giving ye Bark in a considerable quantity we find that before it gets out of ye Stomach a considerable effect is produced, so Antimony raises a sweat before it could possibly have circulated ye Blood.

Again a Number act y^t can't really get into ye Blood as Alum, & a number of others y^t are applied to ye Cutaneous vessels & make them shrink up. yet these have considerable effects on ye Blood, coagulating it & stopping Haemorrhages in Wounds &c.

We shall now endeavour to prove that they actually do not cut alter ye Blood. and 1st

And 1st the Blood is never altered exceptlyⁿ regard to its perfection or imperfectness as if we Bleed a man & give him Bark the Blood will be found after that in its quantity but more perfect coming lock strong thinning quality of the Bark. but if we Bleed & give Bark immediately it will be more imperfect.

2dly The effects the Medicines have upon entering the Blood are quite contrary to what has been imagined. Thus it has been supposed Cortex but really its a most powerful coagulator that we can apply to the Blood Vetour Cortex Serpentaria has been supposed with sharp particles to cut asunder the Blood & reduced into a Vein & coagulates the Blood & renders the effect imperfect. Hence overthrows the Theory upon wch the whole system is founded. Thus have we endeavoured to prove that Medicines can't act upon the fluids consequently not upon the solids quantities of the Dead Body. And as they don't act upon the Machine they we have proved must act by Mere Power and in order to do this must be applied where we can get at the Power, for its not indifferent where we apply them as it is only in some parts that it is visible. and these Parts are Three.

1st The Skin or external surface of the Body wch we rank the Mouth, wch are both sensible and visible. Medicines may act upon such.

2dly The Glands wch are very sensible, but the Blood Vessels wch we may so say sensible of a Chemical Stimulus but not of a Mechanical.

Medicines

Medicines when applied to the Skin or Glands have considerable effects. But the Stomach is the principal part & may in this sense be call'd the Grand Sensorium of the Human Body. Different Parts of the Body are sensible to some particular Stimuli but the Eye is not fitted for Taste, the Ear for seeing or the Tongue for Hearing.

The Stomach is made to vomit by some Medicines taken, nor is it what else allay this, other Medicines again bring on a Total Disorder of the Nervous Power. yet ~~Other Medicines are~~ not sensible. Nature Medicines nor even Calomel could act upon the Stomach unless absorbed, & not at all if only the Hand dipped in the solution or anything applied to the Skin, but absorbed.

We are not judges of a Medicine nothing an efficacious one because it has no taste owing to that it is nothing sensible to us yet the Stomach may as the Shall Snake Root has but little Taste to yet a small quantity ~~yet a little quantity~~ often excites vomiting & a little is a powerful Emetic.

We shall in accounting for the Actions of Medicines show what action they have on the Skin Stomach & lastly the Glands, but it is necessary to be first acquainted with some general Laws of the Nervous Energy &c in our next Lecture

Vect: 0 ly

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Chap. 1. Of the Nervous Power as governing the Medicinal Powers.

Having endeavoured to shew that the Body consists of two parts viz the Machine & Nervous Power, & that the latter is liable to certain Laws and endeavoured to prove that Diseases were affections of the Power, & that the Machine be not in some cases affected yet this Nervous Power is consequence. We come to the Laws of the Nervous Power, by means of which we can apply Medicines to bring back into Original State.

All Diseases are Affections of the Nervous System and are either universal or confined. Now the System in general can only be affected two ways by a Fever viz. in the whole, in some particulars yet all Fevers agree in general, and under the same at the Definition of a Fever we shall take one in its most perfect state viz an Intermittent as it is called and hereafter we shall shew that all Diseases of the System in general are Fevers.

An Intermittent Fever, tho Fever in general is accompanied with a Fraction of small Pulse & Debility of the Nervous System & remedies shewed a large quantity of Bark on the Pulse. Different Authors have assigned different Criterions of a Fever, such as Heat, Quickness of the Pulse, Nervous affections are not Criterions, for Fever may exist without them, as Heat is the best, sometimes more Fever than in Health, the Pulse is also lower, as sometimes as slow as 40 in a minute & Pulse

Hence

Hence none should be properly be called Criterions but in all Diseases there is a Critical Crisis or Change to Disease and all the rest mere Symptoms only as viz. such as Lassitude, Paleness, Tremors, Quick small Pulse, Delirium, &c. — The Cold fit is a contraction of the small Vessels over the whole body, & weakness of the Nervous Power in the Extremities. Hence it follows that all the small Vessels being contracted the blood is thrown upon the Breast & the Circulation is increased. But this wd case we shall endeavour to prove by examining the three Stages, as Cold fit, Hot fit & Sweats —

The 1st symptom of the Cold fit in a person going to have an Intermittent is a Lassitude shewing that the power of Action of the Nervous Power over the body, particularly first the extremities, is diminished. Nervous Power is essential to the blood circulating in the Arteries to which assistance

The Next is a paleness & insensibility of the Extremities, the Paleness owing to the blood obstructed in the Contracted small Vessels, & as sometimes a loss of the Nervous Power in the Extremities they remaining insensible dead, but little Pulse even in the larger Arteries, & so very insensible as they, that a Hot Brick applied to them hardly gives any Pain — hence the Nervous Power is wanting in part.

The Quick small Pulse & Delirium happen both on account of the Contraction of the small Vessels of the Extremities and

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(a) See the Paper presented to the Academie Royale des Sciences by Mr Gray.

and so, if Brain, & the small Veins of the Brain are obstructed & Blood is drove in greater quantity into the large ones in the Spina near the Medulla Oblongata which is the real Cause of a Delirium, which can't be remedied but by cutting off the Brain or Cerebellum, for it is proved Cattle that have may be cut off and yet the Animal live.(a)

The Direct small Pulse is owing to two contrary causes drive more Blood to the Heart & large Vessels, hence the Heart & Arteries strive to overcome this encreased quantity, & if Pulse is smaller in the Extremities the Arteries by their contraction being diminished in size there is also Blood thrown more into the large Vessels as the inf. Precordia, & about the Stomach, found we find that in the beginning of all Fevers there is a weight & fullness about the Precordia, & Hypochondria, hence judiciously observed that by this Symptom we can judge of the hazard of a Fever, for if greater the weight is & greater quantity of Blood is drove thither & the greater the danger. The great dulness of these Vessels causes difficulty of Respiration, and a Nausea & Vomiting is occasioned by their pressing upon the Stomach, & we find that even any violent or sudden shaking causes these Symptoms.

These are the principal or only Signs some for those which follow are consequences or Symptoms of these for the Vessels begin carries on, & complete the Cure, such an admirable Construction is there in Human Body for the use of Diseases

Sect. ii.

In this sense Nature may be said to cure Diseases meaning by that any particular Body, but the Vitals by the Constitution is governed —

This Nausea or the Stomach is the most sensible part, or the Ventriculum Commune of stimulates the whole System creates a free Circulation over the whole Body, overcomes the contraction of the small Vessels and at the same time the Nervous Power is excited and moves about fully & freely over the whole System indicating an approach of the Stage. or Hot fit, and the Symptoms Horror & Rigor are only Symptoms of the Nausea. Not so once of the Disease appear & you are must pronounced right out of Danger & gives birth to Coldness as the Symptoms of Hot succeed come on.

The Horror and Rigor always attend the Nausea, as a person who hinted what a Dose is shudders at the thought of taking one; & any thing disagreeable to the Stomach causes this.

After this the Patient instead of being Cold becomes extremely hot shewing that the Nervous Power is stimulated to act more strongly, for the Heat is always in proportion to the action of the Nervous Power, being greatest where it acts most, as in Blushing the Nerv Power acts most actual Inflammation & sudden Glow.

Chy Medicine is made by the Nervous Power act — strong — taken of the Stomach or even smelt acts speedily all over the Body, & afterwards endeavour to prove that Animal Heat is excited by this Nervous Power —

The

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(a) Hence I Pass in ye Head Back, Sants de Tro
ye Catamen inter Saluam & Prolem

The Pulse now becomes much fuller and stronger but gradually
viz in proportion to the decrease of the Contractions; the
Inspiration, and Breast is more extended the Contractions
of the small Vessels being now overcome & becomes fuller
& more free the blood now being transmitted to every part
of the body more gradually & with a due quantity of
blood turns now bleed through small Vessels of the Extreme
Ligaments. Attended by great pain is observed, that its some
or rather the small Vessels, especially only the external
part or Ligaments of the Head, occasions a headach.
The Internal Membranes are probably very little or
scarcely at all sensible, so that this Water covering
of the Head most frequently are the seat of Headaches
& Delirium which be attended in these Complaints.

In this stage perspiration and the glands are not yet opened or relaxed, nor is there
yet any increase of Urine or Sweat for a considerable time.

The Last Stage is when the strong excited
Circulation taken off the dilatation & Contractions of the small Vessels so as to leave them entirely at ease and
this is the stage alone, that any Antiphlogistic
taking of a Glass of water makes the Relaxation greater than
the Vessels force, and very open & the Man now throws
out plentifully its fluid, Sweat, & Urine its Pore
and Skin is now taken off.

Now as this is entirely performed by means
of the Venesection alone, it seems apt to give the fresh
and Principal Indication for giving Liberty
viz 4.

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Viz to take off contractions in any particular part of the System, & thus exciting artificially a Nausea which we see excited by Nature in Fevers. For all Medicines which cause a Nausea do occasion such a brisk Circulation and free action of the Nervous Power hence useful in Rheumatisms, and of Lettsom and of Inflammations &c. Rheumatisms being a contraction of the small Vessels of the Cutis & thus are relaxed are regularly removed by this sort of Medicines hence the good Effects of Antimony & Mercurials &c.

Any chronic Inflammations, Fevers are also cured for it often happens that the Nausea excited by Nature is not sufficient to overcome the Disease, Hence Nauseating Medicines are prescribed to bring on a Crisis given at any time immediately after an Accession. The Ancients used to give Cold Water for this purpose but People seldom venture to bring on a perfect Crisis by this means; as it is attended with some hazard to the Patient, but is a good way to get clear of one Fit before a second comes on.

Towards the end of Inflam.ns they have the same Effect they ~~[illegible]~~ indeed at any time of Inflam.n but are hazardous, as they make the Nervous Power act more strongly to cure Inflam.n which is already too strong. and Opium is owing to the strong action of the Nervous Power. — This we give only as a short Sketch but may serve as a foundation for future Observations & Improvement.

Finis

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Thus have we gone thro' one Fit of an Intermittent, and shewn the different Stages. We now come to account for its returning.

It has been generally thought, that there was some fault in the Juices that made the Fits return. But this we shall endeavour to shew happens entirely or always from Custom, there is nothing hereditary, either Power over the Human Body. Thus from Custom alone it Fever happens twice a day to every Man, who has been sick or in health, and that generally about 12, 1, or 2 o'clock in the afternoon & again at 7, 8, & 10 or 12 at night being different in different persons, and after this they are freedom till the time comes of next day & this very exactly. Person may observe.

Now if the Body has once been accustomed to any thing it is apt to recur. As in a Woman who has once miscarried is apt to do so again from the same and one who has once done it her full time will have a good chance to do so again, not that the Womb is weaker after a Miscarriage than Natural Labour so in many other things, as a Person who has once had a Fever will be liable to it again, and so it happens in Fevers regularly at 2, 3, 4 or 5 o'clock and customs may be changed gradually, so shewn that it does not depend upon the Juices of the Stomach for let a Man accustomed to dine at 1, part till 5, he will find himself little uneasy than if he had eat as usual.

So

So in sleep, if a Person is accustomed to sleep 12 hours, he upon first finding himself sufficiently refreshed of he sleep only 5 or 6, but if he accustom himself to sleep only 6 for some time he will find himself as much refreshed by it, as he used to be by 12 hours and so if he accustom himself for 4 or 5 days to awake at a particular hour he will get the habit of doing so ever after. Such is the Power of Custom that a Fool by attending to the Clock, got the habit of telling time & used to call about of Sheets as regular as possible. So it is a Fever being once generated in the System will be as apt as any thing to recur, & ought indeed to be more than any of these things just mentioned as it affects the System so thoroughly.

Suppose then a Man has an Intermittent as soon as the same time of Night is coming on the Natural Fever will arise as an Irritation to bring back that to be and it last before, hence the regular return of Quotidian Tertian Quartan &c. The Regular Natural Fever bringing them on again.

But there are Irregular Fevers to happen from any accidental Irritation having the same Effect as that of the Natural Fever, & depends therefore only on the Irritability of the System that the recurring of Regular, & Irregular Intermittents happen.

A 2:

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A different indication therefore is to be taken of a Intermittent cure we can hope effect by Medicines. Many Medicines have this effect but particularly Bark exceeding all others in intermittents & yet by its great Astringency we can alone account for its effects, for relaxing strengthening quality, Bitterness & Astringency it is used in remittent fevers.

These fits of the fever are sometimes longer sometimes shorter, some often thro' three days in a short time, and some even fill of it is a fever as much as those of the intermittents, also the symptoms in the one happen also in the other, only in the one is longer the other shorter, and in a continual fever one fold sometimes or more the other is over.

A Woman going into Hysteric fits felt a Lassitude, Coldness of the Extremities, which are pale owing to the contraction of the small Vessels. Her Urine is pale owing to contraction of the Vessels of the Kidneys, the Pulse is generally very quick & small, and there great symptoms of the Hys. Fits. Then an Emetic Vomit in the Praecordia, Nausea & irritation of the Vessels to increase of Circulation, she feels pain begins to move and also her Circul. falls into a Copious sweat, discharges a large quantity of Water & then settled.

The same holds good as to the indications of Cure in this as in the other, as Vomits take the help of the Bottle, the freeing the Stomach from Malaudice can

do

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So also Bark and other Astringents wch could not keep off a strong one of an Intermittent yet sufficient to keep off the weaker fits

Mr Sivers we have endeavoured to prove to be owing to a contraction of the small Vessels into wch they do contract whether by Muscles wch may exist tho not capable of being seen as the Cremaster wch in contract tho we see no Muscles for this purpose, so that Contraction may perhaps be owing to something else besides Muscular Action

passm 3

These Contractions we call Spasms but wch we mean that the small Vessels are contracted as in Spasm have been applied to this contraction, nor do we intend to call contractions of the Vessels and don't mean by it any accurate specialty of wch we have no Idea. These Contractions are more or less difficult to take off in different Complaints, in Asthma they are very probable, hence another Indication for giving Medicines wch take off Spasms. Hence we see Ether, Vol Alkali, Heathens Burnt Leather of Stag, Cold water and Bracing Medicines by wch if it is made to go off but short going thro' all the Stages wch it would have done if not prevented by these Incommodiens.

There is no Objection to these Medicines that they can't take off Spasms in other Cases, as they are stronger, and it is necessary in all Cases that the Causes be adequate to the Effects

Large

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Mag. Peter Borismann udnævnt til overlæge ved Frim.
ved Sp.ⁿ Hospitale.

large Doses of Musk ye Dr has been present
an Intermittent taking off ye Spasms & preventing
ye Course ye would have taken.

So we have now treated of spasms arising
Febrile as are those of Intermittents, We come
now to those yt are more obstinate & have in Continued
Fevers as should be called, but there is no such thing
as a continual Fever, No Fever beginning & going
on regularly ye Patient growing worse & worse.

The Patient generally grows worse or better at some
particular time in ye Night & ye next day again
at 12 o'clock or else again at ye Night & about the
same time & so to Relume. Hence a
Continued Fever is no more than two Cold Fits com
on before ye first is removed, but care may be here
taken not to confound a sensation of Cold in the
Cold Fits, Paleness of ye Extremities, Delirium,
Quick Pulse &c with Symptoms of ye Cold Fit.

Hence a Continued is only an Intermittent continued
as we measure by comparing it to ye Intermittent
Remittent. Indeed in Tertian &c we find ex
Accession at 12 a Night, it goes off at 12 next morning
returns at 12 & so on.

A Remittent Fever is when there is little & indeed
no perfect Intermission.

Hence we take another Indication to drive off
ye Cold fits before written remove by Nauseating
Medicines such as Antimony &c

Chiefly

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Nature for of different nature of Fevers, Secondly
regard to ye Fence of ye old Physicians.

The general Symptoms here of a different cause
either from too great strength or too great weakness
of ye Nerves we have a strong instance in ye Fever
which ye Nervous Power is so excessively & ye cause is
in ye Inflam. Fevers. of ye latter we have an instance
in Hysterical People.

Hence Fevers are of two sorts viz Inflam.
& low Nervous which have also called Putrid.
Inflammatory when ye Symptoms are of such violence
not arising to ye Nervous Power acting too strongly
& the low Nervous when ye Nervous Power is weakly
or lost. But we seldom find a Fever purely Inflam.
or purely Nervous they generally begin Inflammatory
and Nervous, ye Fever by continuing long changing
the Constitution from a good state for worse one.

Hence ye Indications in the Fever 1st to weaken
ye Constitution for ye Palliation Evacuations to prevent
its being overcome by the strong action of Nervous Power
2d that also we should act as a person who
takes a little quantity of Wine or Opium in great
but more fuddles him & at last makes him drowsy
Hence we see the particular management of Fevers
which is of such consequence to us.

1st to diminish the strength of ye to prevent ye
Patient being killed by ye strength of Fever and yet
not diminish it so far but that he may have strength
to go thro with it —

2dly

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Ly

2 Offer if an Inflammatory stage is over to give such Medicines as will raise it. Palsey is however is ye most difficult thing in Physic when it is once rooted. But it is concern matter to consider it along time before all Evacuations do. But to make it strong enough to support ye Patient is a Work. Yet to bring it to a Crisis is really difficult. And this is not to be done without using Healing Medicines such as Bleed is, or Cathartics but don't raise ye Pulse & Irritate ye Medicine but also an Anodyne Medicine Cover as well as an accumulating one to very good Effect. Stoles respecting of this Sort of Medicines Bark is excellent & Inferior to Wine & is matter. Bishop about Spirituous Liquors & Wine. From this we may understand ye Practice of the Ancients in ye first month Chiot Dicta afterwards more strengthening.

Fevers may go off with or without a Crisis in a strong Exacerbation comes on Crisis happens but sometimes ye Fever of ye Other is in a state of Exacerbation (tho' hardly perceptible) ye Disease is cured without any Evident Crisis & by degrees wore.

These are given only as hints to be improved in future Practice & to be improved by Observation.

Dr Gr. 18

964)

No. 20

Lect. 18. On Vaporation.

Pharma done in the Operations on Bodies fluid in a small or great degree of Heat, are to be referred to the first Class, or such as take place by reducing Bodies to the state of Vapour.

Vaporation is an Operation performed on Bodies by reducing a part or whole of them into state of Vapour. We shall again prepare what we have said in Bodies belonging to —

Vaporation

is
- Evaporation
- Sublimation.
- Distillation.

Evaporation

is
- Concentration
- Crystallization
- Evaporation to Dryness
- Sublimation
- Retraction

Distillation

is
- Ascensum
- Descensum
- Obliquum

This Operation is performed either for fixed or volatile parts of Bodies. 1st it is done generally for Separation as of other Operations is done for Combination & Separation and it is sometimes even done for Combination & Separation. It is therefore fixed Separation of the Volatile & Fixed Parts of Bodies, and this is generally performed by reducing the one to a state of Vapour, while the other remains unchanged as it was before the Volatilization of the Volatile parts.

Evaporation may be divided into 2 sorts viz that for the Volatile & that for the Fixed Parts of Bodies. and that for fixed Separation of Volatile from fixed Substances is the Separation of Water, Spirits & the Aqueous Menstrua, or free from it, is Evaporation, and have only a degree of Volatilization & Burning.

Evaporation is therefore an Operation by which the Volatilization & Burning of Water & other Bodies in a fixed state of flesh & Blood, in getting those of Water as menstrua which enter into Volatilization. but driving Water from Bodies & Heat is Evaporation.

Evap.n is performed either for Chemical or Mechanical Operation, being always for Separation as part above.

When any Solid is made to a Solid Mechanically by Heat alone it retains some properties, as in Glass Water & Metals amongst the other properties retains that of being easily changed into Vapour. Thus and Evaporation has been fixed part called Drying. 2d is made Vapour & Water or other fluids mechanically

Evap.n

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Coagt. also takes place for the rapid Operation
of Fire here shewn when on Operations that
Bodies have not generally at that propriety destroy
were chem. & then but being one Exception, as
that retain of property of being changed from a Solid
to a Vapour into Vapour so that upon applying Heat
have we seen the Bodies more Volatile

Exple. Nitre & Water chemically united of Water
nothing a Chem. Solution of Nitre which retains of
property of being easily changed into Vapour whilst the
Nitre of not, tho' their combination makes them lose
many of their Properties as of Nitre the Solidity &
Water its fluidity Gravity, yet Water or Humidity
by being volatile in certain degree and the Nitre its property of being fixed in that heat.

Another Foundation for the Possibility of dissolving
of Universal Attraction. We have endeavoured to point
out in a number of Instances & endeavoured to prove
that a Compound will not bear sufficient heat, it may
always reduce it Elements separated by this means.
If therefore two Bodies are united into a fluid Compound
& lose their Property of being volatile in Heat that
were before yet if they will bear heat enough they may
have their Attraction destroyed & be separated from each other.

Exple. Fixable Acid & Water united of Water loses
of property of being Volatile in Heat it was before
in 3 of 212 degrees but requires a greater degree of Heat
before it can be separated from the Acid as
does from the Nitre by a Heat of 212 degrees

Exple.

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yet its Attraction is not so strong to the Acid but it will be destroyed by a heat of 400 or 500 degrees it won't be enough to raise the Nitrous Acid into Vapour. Fixed Acid can be again yet concentrated —

Now have we explained the three different Conservations upon which Evaporation depends. 1st Volatile Elements retain this degree of Volatility in Compounds, and 2ly when the Attraction is destroyed by Heat.

There is still a considerable Resistance to Evaporat.n and that is Air. Air readily penetrates all Bodies whatever especially Fluids, so that there is no fluid in vacuo dissolved. The Nitrous Acid in requires about 800 degrees of Heat to make it volatile, yet it rises to the Cold Air alone leaves a part of its weight the Air having so great an Attraction for it.

All the Evap.n don't depend upon this Solubility yet the Air is a considerable Resistance to it. Hence the Breadth & Shallowness the Liquids, & more of the Surface in proportion will be applied to the Air.

Evaporation is either fixed Acid or Volatile Parts of Bodies. The 1st Kind is Evaporat.n & Ustulation. Evap.n is either for Mech.l or Chemical Reason. All Evap.n is assisted by a free Accession but often an obliga Expulsion of Air —

Evaporation has been divided into a variety of Species, according to product of the Operation they are 5 viz Concentration Crystallization, Evap.n to Dryness, Inspissation, Distillation, —

(a) Concentration is when Water is conveyed entirely from some Bodies, as Red

(b) [illegible] when Water is [illegible] after the Water was so perfected, the Salts formed within [illegible] shall lie at bottom, in a [illegible] mass Nitro of Water, and were excluded, that [illegible] of Nitre [illegible] Salts is made [illegible]

(a) Crystallization has been already taken notice of as a Theory & Principle on which depends (b)

An Experiment for Chrystallization the following Cautions ought to be observed. 1st not to use too great a heat least we calcine part of the salt & so marr the Operation. 2d is that the Salt Dissolved should be of a fixed Salt, it often happens in Exp. for Crystal, the salts crystallizing by the Idea of the Vulgar a little quantity of Oil or an insensible Spirit by the attraction of Cohesion as in Capillary Tubes will thro' water rise of a liquor which Evaporating, as we see in Sal Ammon & Water, hence there are to be broke down as they form —

Lastly Care is to be taken not to Evaporate too much of the Water, in no Crystalline salts form as a quantity of Water is necessary for the Crystals & to contain in combination, hence we have here instead of new Crystals Evaporate Down & which is Another Operation.

It happens to some Salts that if Lime is added to them they attract a considerable quantity of Water from it, hence it is often difficult to Crystallize them, and after they are Crystallized, hard, yet liable to keep entirely, as Water will be necessarily attracted & mixed with them. Deliquium animi since of a nature in fixed Alkali.

But then as it happens to some Salts Alkali that they are not easily accompanied thus may be exposed to great heat without being hurt, hence,

Hence the second use of Evaporation is here shewn viz to dry wet, taking care that the Salt does not stick to the side of the Vessel towards the end of the Operation, but we shall be obliged to break the Salt to get it out by reason the Wood or other materials harder —

The next kind of Evapor.n is Inspissation or is the Thickening of Aqueous Pieces by drawing apart of the Water w.ch Salt restrain, Vinaigre is liable to undergoe Fermentation & recovered by the Gr. Wine & Juice of Fruits Herbs & Roots parts of Vegetables incapacitated by Freezing being destroy'd & don't ferment recoverable to high in Perfume. The Product of these is mostly used Robs. Care must be taken in these Cases Boiling no more than is just sufficient as they are very subject to burn, especially those called Sweets or we must frequently heat thus we should therefore have them in less Quantity parts & have recourse to heated Water Bath in preference to any other Heat —

The next Species of Evapor.n is Extraction or is by evaporating of Water or other Liquor in w.ch we made a Decoction or Infusion of some Vegetable substances & the Product is called an Extract. I am lately introduced for better Audience as from a Prefix of Gentian.

As this is generally performed only on a particular Class of Medicines viz. Bitter stomachics it affords us one Caution.

clos

Tonics whose Virtues are mostly applyd to strengthen the Stomach and other Parts of Digestion, but every thing Improperly called so from strengthening, meaning instability, and contrary to Irritability. Therefore Decoctions & Infusions made in Water, Wine, Spirits & Infusion in Oil should be preferred after added to Water in Balneo Mariae without Impregnating water, & thus managed they may be of service, but otherwise only mischief for the Pain & Expense spend above Reasons.

Vinous Infusion is made in Alcohol instead of water as got rid of the Parts & Products called Resins & not an Extract & Gummy particles insoluble in the Alcohol, hence Resins, Colic Pains — Jalapin —

The last Species of Evaporation Concentration is Evaporation of some particular Fluid so as to have it remain deep containing Impurities or a portion of its substance whole & unit, but not so far as to deprive it of its fluidity, this differs from other Operations where Products are called Fixed Solid & Volatile, but the Water is vaporized & called Concentrated by Evaporation. The Cautions that of Salt is naturally acid so much so the Dose or effect to be of a Neutral Saline fluid —

Thus have the four called of different Modes of Evaporation, and different Operations by it decomposed a fluid solution to fluid part by means of a Retort & Receiver to be collected in Vapour.

Fifth.

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We now come to the Theory of Operations on Bodies & the Water of Vapour, when we can to collect the part wch is reduced to Vapour. This has been considered in many ways, Some Operation of Chemistry, but I fear have not hitherto been that it was the Quantity of the Condensation effected that first made Chemistry be considered as a distinct Art.

The Theory of Vaporation depends upon the Recondensing of Bodies into a Vapour back to a Solid or Fluid form. For as Bodies are solid rendered fluid by increasing their Heat, so are they to be rendered solid by diminishing the Heat so that whatever they are in whole or some as fluids.

The whole art of Operation depends upon bringing the Vapour into Cold great enough to recondense it into a solid or fluid form. It has been divided into two Heads. and

1st Distillation wch is a recondensation of Vapour into a Fluid form from Vapour, so as to separate the part wch is of a state of Vapour from the part wch is not but Vapour.

2d Sublimation wch is a recondensation of Vapour into a solid form from the state of Vapour, so as to separate the part wch is in a state of Vapour from that wch is not but this Sublimation is apt to be confounded with Distillation

Particular

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Sect: 2d of 23: On the Chemical Vest of the Vegetable Acid

We acquire from Vegetables 3 diff.t Acids, tho according to Boerhaave there are five, the last Sebacic (a) (he calls one) tho in fact there are only 3 Wine formed 1: of the Juice in the Native 2 of Fermented 3 of Distilled.

The Native is of sour juice of Plants, & Fruits as Lemons, Oranges, Apples &c. these the Acids believes are all of one Nature tho he is not certain.

The Fermented is obtained by the Acetous fermen.n: wh. takes place in all Wines after the Vinous fermen.n has changed the Sug.r into Ardent Spir.t & if the Wine be exposed to a heat between 65 & 90 Degrees this fermen.n takes place.

The 3d or Distilled Acid is that wh we get from the Chemical Analysis of Bodies. We are not sure that it exists in any Bodies, or whether it be the result of Operations.

The Chemists in general supposed these 3 same having the same properties, only mixed with more Oil or Mucous, but they either yields as much as the Vitriolic & Nitrous.

The

(a) or Medium fermentans, it can't be examined on acc.t of its volatility, & we are not certain of its being quite Acid, & only know that it will hide Menstruals, when applied to them. th. this acid is hence is of Medium Combination para. n.

The

Menstrum	Solvend	Mean of solution & Appearances	Result	Mean of solution & Generated
Aetherum Spiritus Rectificatus	Inflammable substances except Sulphur	Alcohol with a small Qty of Oil of Wine. Oil is united with it. Venous by uniting one of the substances it affords strength & therefore can be it a preservative in a strong spirit is not drawn	If concentrated, & Oil of Tartar made from a dulcified acid — Alcohol.	Other Gum and
	Fixed Alkali	By Addition with Effervescence if acid dilute small Qty & Ebull. if large	Tart. Vitriolatus regenerated Tartar	By distilling off the Alcohol & itself Alcohol.
	Fixed Volatile Alkali	—	Tartar. Vitriolatus Volatilis or Prochaska	—
	Calc earth	—	Tartarum Vitriolicum	—
	Vol. Alkali	—	Tart. Ammoniacum Sp. Mindereri	
	Magnesia	—	Tart. Magnesiae	By distilling Lathe Salt but it, & Alcohol
	Zinc	But not reduced to Indicates to a Calx or by Calcination or Gas exp. from a hot Metal	Tart. Zinci	By distilling the Metallic Salt by itself Alcohol
	Cobalt	—	Tart. Cobalti	—
	Lead	—	Tart. Plumbi Rect. Solutus	—
	Tin	—	Tart. Stanni	—
	Iron	—	Tart. Ferri	—

The Fermented Acid is what we shall principally treat of.

It is the Essential Property of Acids to be converted by ye fixed Alkaly into Neutral Salts. and

It is ye Essential Property of each particular Acid to form a particular Neutral Salt, diffr from all others. Thus for Exp: the Vitriolic Acid & fixed Alkaly make a Tartar Vitriolat. ye same Acid & ye Volatile Alkaly make ye Vitriolat. Sal Mirabile Glauberi. ye same Acid & Volatile Alkaly make Vitriolated Ammoniac. But if we take a diffr Acid & combine it wth these Alkalys diffr Salts are formed

The Native Sea Acid combined wth ye fixed Vegetable into a Salt easily crystallizing: whereas the Ferment^g Acid combined wth ye fixed Alkaly forms a Salt wch crystallizes wth ye greatest difficulty easily soluble in Water & attracts moisture from ye Air.

In the manner from the Distilled ye Salts differ greatly; inasmuch as they differ in their Essential qualities. The Native Acid remains fixed in ye fire scarce by any heat to be distilled, whilst ye others are easily rendered volatile.

From Fermentation we have two Acids the one in a concrete & other in a fluid form, the solid one is Tartar & ye fluid ye Vinous. Ferment^n wch takes place before the Acetous ferment^n. That ye Tartar differs from Vinegr is evident for it is to a combination of

Bismuth		Sart: Bismuthi
Regulus Antimony		Sart: Antimon Vitr: Emetic Benedict
Copper		Sart Cupri Vitriol Diagrede
Regulus Arsenic		Sart: Arsenici
Mercury		Sart Mercurii
Silver		Sart Argenti
Gold		Sart: Auri
Platina		Sart: Platina
Earth of Alum	Addition	Tartarum Aluminosum
Water		Deuleiteid
Camphor		No Effect
Ether		No Effect
Sulphur		No Effect
Clay		No Effect
Ground Nut Earth		No Effect –

of Tartar & Ethereal Vinegar is poured the Tartar is precipitated.

The Vegetable Acid is never found in ye Bowels of ye Earth, tho' a great quantity of it is thrown into ye Earth, yet ye Earth destroys it; neither is it ever found in ye Animal or Mineral Kingdom, nor is it ever found in fire Soot &c; It is only found in Fermented Wine in this way it is not combined wth any substance that could destroy its Acidity, but is joined wth Water, Oil, Mucosity & a little Earth, from wch when we want ye Acid pure it is to be separated by Distill^n in ye Retort & Receiver the Acid rises in fumes & is condensed leaving the Oil Mucosity & Earth behind. The Acid is not quite so Volatile as Water, nor so easily changed into Vapour, what comes over first therefore is weak, contains much Water and should be thrown away. The Retort likewise should be well filled near to its Neck that ye Acid may not have a great way to rise, as it is not very volatile, & ye Neck of ye Retort should likewise be bended down that ye Acid may not return into ye Retort.

All Liquors especially those wch contain any quantity of Oil if exposed to a no considerable degree of Heat or at a particular task wch we call Empyreuma, wch is very disagreeable often noxious, if great Heat is used here ye Distilled Vinegar will be Empyreumatic;

which

which can't be prevented, for if such a heat as will make the Vinegar Empyreumatic is not applied, the Acid won't rise; the Vinegar should not be forced over, one 4th part comes over is to be thrown away, the receiver changed & Distill. is to be continued till two thirds of the remainder come over, & this is the Distilled Vinegar. The remainder is in a concentrated state but contains much otherwise a Matter, is viscid, foul & Empyreumatic. In this way the Distilled Vinegar is very dilute, & in 2 ℔ there is not above 3j of strong concentrated Acid. By Distill. we have it free from the Mucus yet is still united to Water.

To procure it free from Water we should combine it with such Bodies as destroy the Acidity, either Alkaly, Earths or Metals, & then forcing off the Water, as in Verdigrease it is united to Copper in Lace Saturni to Lead; from these it may be procured by destroying Attract. by Heat, or by an Elective Attraction.

Phlogiston has the greatest affinity or Attract. of any Body to an Acid, yet it requires great Heat to unite Acid & Phlogiston & if applied the Acid & Phlogiston fly off leaving the Alkaly, &c. If you distill any of these Substances with it it is combined by themselves, the Acid & Phlogiston uniting come over making an Alcohol which you obtain. But we may get the Acid by add such a body as has a greater affinity to the Solvent than it is now combined with it does not require such a degree of

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of heat as will unite ye Phlogiston to ye lead.

The fixd Alkaly wch comes first in ye Table of affinities won't do nor ye Calcareous Earth, nor the Vol Alkaly because its volatile nor Lead ore in because such a heat is required as would unite ye Phlogiston. but when we come to Copper that will do it having a less attractn to ye lead, wch may be separated from it; wch a great degree of heat, this way therefore is allaccount not adviseable as great quantity of ye Metal is volatilized, wch makes it unfit for internal use, ye Process is well described by Boerhaave, it is by falling Verdegreen into ye Vinegar & forcing off ye lead.

The Best & Best Way is by an Elective Attractn thus when combined wch ye fixd alkaly it may be separd either by ye Vitriolic, Nitrous or Marialic Acids wch has stronger attraction to ye Alkaly than his Vegetable lead wch is detachd from it, but ye Vitriol: lead being cheapest & not volatile is always used. the Process is the same as for obtaining the Marialic or Nitrous lead therefore need not be repeated, only one thing is worth while to be remarked. It is expensive to make regenerated Tartar wch distilled Vinegar wch is not necessary as it may be separated from ye lead & Tartar by one Operation.

Pot Common Vinegar has no effect upon ye fixd Alkaly it is singular that a little quantity of ye lead does not effervesce but a great quantity does. aft

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after having saturated ye Alkali with ye Acid we pour it into an Earthen Vessel & then evaporate it to dryness ye. given Tartar thegenerated, this Tartar is impure yet as good as any for obtaining ye concentrated Vegetable Acid, If to a Pound of this we pour Nitrous Acid we get Concentrated Acid, i.e. in ye again into ye Alkali & repeatedly procure ye Vdr Acid gently gelid quite pure & free from Empyreuma. this Acid like ye other has a Rancency — and is capable of acquiring a specific Gravity w 13 or 14 to 10. Combined with Alkalies it forms diffr Neutral Salts, as w ye Vitriolic Acid a Reg Tartar, w a Fixt Fossil Alk. Polycrest of Rochelle w. Vol Alkali &c. Mindrer w. Salt may be obtained in a solid form by a double Elective Attraction —

It dissolves ofy Metals only Lead or Copper in a Metalline Form, but dissolves them all if they are calcined, and forms as many Neutral Salts, the chief of these Metalline Salts have a particular Sweetness as Lead, hence call'd Sugar.

The Salts w ye Vitriolic & Nitrous Acids Caustic ye Muriatic ye Vegetable very sweet.

In ye most concentrated form that has yet been tried it does not dissolve Expressed or Essential Oils whether if alike more concentrated it would do it is uncertain. It has no Effect on Sulphur. This Acid.

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This Acid unites w.th Alcohol but only into a Mechan. Mixture neither of Inflammable Acid Alcohol nor of Acid it is of Acid ~~[illegible]~~ state altho it burns; & effervesces w.th Amonia.

It is impossible to unite the Mineral Acid or Vegetable Acid w.th Alcohol even in their most concentrated state whereas the Vitriolic & Nitrous do.

Neither solves Magnesia Earth of Alum the 3 Alkaline Earths, but not Clay, whether it would do it in a concentrated state is uncertain.

Its effects upon Animal Fluids are not worth taking notice of, in its weak form it is said to dilute them but if concentrated it coagulates & turns them black, whether it would dissolve Animal Substances in its most concentrated form is uncertain.

Besides these principal ones there are other Acids produced in Nature, as the Native Distilled Acids of Vegetables Acid of Amber, Borax, Phosphorus, but on these few Experiments have been made & are not so well known

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Article of 24. On some more uncommon Acids, as the Vegetable Native Acid, of Amber Boracic Acid & Phosphorous &c —

The Vegetable Native Acid is obtained from sour Plants & immature fruits. This Acid is of considerable use in Medicine & Oeconomical purposes but the Water contained in it makes it apt to ferment.

The only Process here added is to free the Acid from the Water by Evaporating in a Water Bath, by which means we obtain the Acid concentrated pure & retaining its properties without Empyreuma; in the Sand Bath generally used heretofore.

The 2d Acid we take notice of is the Distilled Vegetable Acid. On making a Chemical Analysis of any Vegetable Acid comes over, as in the Distillation of Turpentine. The Acid is at first weak but may be concentrated by Evaporation, & has been much used in Medicine.

This Acid being contained in Tar in which it is united to a fixed Oil, and being soluble in Water, and the Oil not the Acid may be obtained free from the Oil by powerful Water & by Distillation. It is obtained most pure yet not white without some Empyreuma.

Tartar got in Vinous Fermentation. It is found in considerable quantities in many Wines, & remarkable

Table of Unommon Acids

Name.	combined with	New Salts
1 Native Vegetable	℔ Fix V. Alk.	— Sulphat Draught
2 Distilled. D°. f^m Jar.		
3. Tartar.	℔ Reg^s of Antim	— Emetic Tartar. & Vin Antimon
4 Ants.		
5 of Phosphorus.	Vol Alk.	
6 Vol Vitriolic		
7 of Amber		
8 Sal Sedat.	w Nitron	— Borax
9. Arsenic	Reg^s of Arsenic	White Arsenic

No 28 It is purified by Chemists for Medical Purposes being dissolved in 20 times its weight of Water, filtrated & evaporated, it forms its Crystals on ye top of the Water called therefore Cream of Tartar.

The only Solution in this Acid is of ye Fixed Vegetable Alkali in ye Tartar Emetic.

From Animals & Acids are obtained wh differs from those as well as from ye Muriatic Acid wh is obtained from Animals. First the Acid of Urine wh is got by burning them & then pouring Water upon them, its properties are not well known.

The 2d is ye Acid in Blood & Urine wh is other wise ye Muriatic wh is always united wth ye Vol Alkali, the other is ye foundation of Phosphorus, making when united wth a Phlogiston a substance wh burns if applied to Air. This Acid has this particular property of being more fixed than any of ye Alkalies, for if when united wth ye Vol Alkali you destroy the Attraction by means of heat, ye Alkali flies over contrary to ye General Rule, leaving ye Acid wh may be made red hot, always tho' retaining its fluidity.

In ye Mineral Kingdom we have two Acids one of them a compound, viz: ye Vol Nitrous Acid, being ye Vol Acid united wth Phlogiston; this is obtained by mixing any inflammable substance wth Nitre & distilling off a Spirit.

It differs from the Comm.n Vit.l Acid as much as y Nitrous or Muriatic, & swims in y Vacuoles of the Earth & is very noxious often killing people. Its Attract to y fixed Alkaly is less than either that of y Muriatic or Nitrous w.ch if poured upon a combination of this Acid & y fixed Alkaly, this Vol Vit Acid flys off shewing itself by its particular smell.

Another Acid met w.th in y Mineral Kingdom is y Acid of Amber of whose properties we know but little, tho much used in Medicine. Amber consists of Bituminous Oil, & this Acid w.ch is to be obt.d by Distill.n

The Process is, put y Amber into a Retort, & apply first a gentle Heat w.ch is afterwards gradually to be encreased, the Acid sticks to y Neck of y Retort & y Oil gets into y Receiver, & the Flegm & Flasks wont do

This Acid is used on Acc.t of a small quantity of Oil w.ch it contains. Having obtained the Acid we sublime it again in order to purify it, but y least way is by means of an Elective Att.n first joining it w.th y fixed Vegetable Alk., then Add.g y Vitriolic Acid w.ch decomposes it, & upon Sublimation it becomes quite pure & White, but is then useless in Medicine, its Medicinal Virtues being owing to y Fossile Oil w.ch is a good Antispasmodic. Wonder not then that it probable that y Vitriolic Acid united w.th this Oil will make this Acid w.ch is call.d Sal Succini —

The

(D. Fr. Sec.)

A Table of the Affinities of Subst.s to Acids according to

Nitr. Acid	Muriat. Acid	Nitr. Acid	Nitr. Acid	Muriat. Acid	Fluor. Acid
Lime	Lead	Lime	Lime	Lime	Lime
Iron		Lead	Tin	Tin	Lead
Bismuth	Bismuth	Iron		Iron	Iron
Copper		Bismuth	Bismuth		Copper
Mercury	Mercury	Copper	Copper	Copper	
Silver	Silver	Regul. of Arsenic	Regul. of Arsenic		
		Mercury	Mercury	Mercury	
Earth of Alum.		Silver	Silver	Silver	
		Earth of Alum.			

The last of ye uncommon Acids is that of Marax
wch consists of this Acid & ye fossile Alkaly, wch Acid is
to seperate by an Acid whose Attn to ye Alkaly is greater
This Acid salt differs from all others, is not soluble
in Cold & but in small quantity even in hot Water, there-
fore it falls to ye bottom in a Crystalline form.

Exp: The Vitreous Acid poured upon a solution of
it in warm Water precipitates it, & as soon as ye Water
cools ye Acid falls to ye Bottom. Some recommend
subliming it into ye neck of a Receiver, but obtained in
this way it is as pure as if sublimed, The Vitreous Acid
is used, because when it is combined wth ye fossile Alkaly
it cures the Vitre — The Properties these Acids
are not well known, few Experimts have been made
on them, the Chemists only endeavouring to prove
that they were ye same wth ye other Common Acids
& not enquiring into their properties.

Now we come to compare all the Acids in general
particularly ye more uncommon ones.

The Specific Gravity of ye Vit Acid is nearly as 18 to 10
of Water Concentrated. The Vitreous — next as 16 to 10
The Muria — next as 12 to 10
& The Vegetable next 12½ to 10

It is a quest'n what ye Specific Grav depends
upon, whether upon an Essential Property in ye Acids
or ye quantity of Water contained, it is certain that
ye Specific Gravity of any Acid is less when it is mixed
wth Water.

As

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lies ye Spec: Grav: of ye Vitr: Acid as 18 to 10, while and that of ye Nitrous Acid as 16 to 10 only, this a Question whether so much Water is not mixd by ye Nitr: Acid as to make it specifically less. This is certainly a mistake as ye Acid of Borax wh is a dry Salt, without any Water is of less Specific Gravity than any of the other Vegetable Acids and that of Water itself. It is however the peculiar Property of each particular Acid to have a greater Specific Gravity, and in Prescribing the Specific Gravity should always be remembered, as in Prescribing ye Qlty: Vitriol wh is of two sorts, ye Gallic & Cornus, the latter is frequently found to differ much in strength. and it would be least always to prescribe Acids in ye: most concentrated form. Alb the Salt Sedative or Acid of Borax shd be washed in cold Water till tasteless.

All the Acids are soluble in water ye Acid of Borax in Warm, all ye others in Cold. All of them will attract Water from the Air are therefore Deliquescent. The Affinities of Acids seems to depend on the Water wh is mixd even wth ye most concentrated in some measure, that it is so is evident from ye 2d Exp: page 8 we unite ye Concentrated Acid wth an Alkaly and force off the Water, ye Acquisition of Alkaly is not near so great as the weight of ye Acid before Mixture

they.

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They may all be got in a solid form by freezing the Nitrous most difficultly, y Muriatic next, y Vitriolic next, and the Vegetable y easiest of ym all. The Nitrous won't freze but in 40 degrees below nothing of the rest.

The Vitriolic Acid upon mixing its Water generates Heat as does y Nitrous. The Muriatic its fumes made to pass into Water, in that concentrated state generates heat but in y most concentrated state we can obtain it in a solid form it does not neither does y Vegetable.

The more concentrated y Acid y greater is y Heat upon mixd wth Water. This is y foundation of y Alum Phosphorus.

If we calcine Alum wth Charcoal y Acid in attracting Water from y Air will generate so much Heat as to set y Charcoal on fire, on exposing to the Air.

With Ice or Snow they generate a great degree of cold by y Acids uniting wth y Ice, the Nitrous is y most remarkable generating y greatest.

They dissolve Alkalys into diffrt Neutral Salts (as in y Table of Neutrals), wch is y Spin prop of Acids.

The Incommon Acids do y same —

The Vitriolic & Nitrous dissolve Oil & Alcohol the Muriatic & Vegetable will not, y first being always more concentrated this therefore a question whether

whether it depends upon their peculiar properties, or their being concentrated, but it certainly depends upon ye: peculiar properties for ye Muriatic Acid in its most concentrated form as in fumes will unite w.th Alcohol tho' only mechanically.

None of them will unite w.th Sulphur.

They dissolve or have an Affinity for all Metals except Gold & Platina & for these they have but little Affinity. There are 3 ways of combining them w.th Metals 1st into Salts soluble in Water, 2dly into a Corrosion — 3dly such Salts as may be decomposed by Water poured on an Lib.: of Glass tubes.

Lib.: 1st upon a solution of Reg of Antimony in ye Muriatic Acid we pour Water ye Water unites w.th ye Acid & ye Regulus falls to ye Bottom.

Two of ye Acids when united will dissolve some of ye Metals more easily as Gold & Platina & w.ch neither of them would touch in a separate state.

Some as Tin & Reg of Antimony can't perfectly dissolve in Muriatic Acid but only make a Corrosion but to make a perfect Solution require first to be dissolved in ye Nitrous Acid, in w.ch they perfectly dissolve & then ye Muriatic Acid being added w.ch has greater Affinity w.th them than ye Nitrous it attracts ye dissolved them into a Salt soluble in Water. N.B. This well accounts for ye operation of dly Reg, tho' Gold & Platina are not touched by ye Muriatic Acid. —

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They all join with Magnesia, Calcareous Earth, Earth of Alum, by the 1st method of Saturation, where ye Acid can only be united with a certain quantity of ye Solvend & ye Solv. only with a certain quantity of ye Acid or Mineral Alkali. Perhaps also if contrarily ye Solvend dissolve Clay, but this is uncertain.

It is a question whether ye same quantity of Acid will dissolve an equal quantity of any of these substances.

Exp. 34 & 40 grains of fixed Alkali is soluble in 33 gr. 17 of ye Nitrous Acid, in this Exp. ye Nitrous Acid differs in about 17 gr. or Di from ye Experiments of Mr Stembere which have not been made accurately. but whether it requires exactly 33 gr. 17 of any other Acid to saturate ye same quantity of Alkali is not sufficiently tried by this Exp. 33 of Nitre consists of these proportions & it is probable that 33 of other Salts contain nearly ye same.

Elective Attn takes place in ye Combination of Acids with other substances & considerable differs from ye Common Tables of Mr Attn in this that ye Calcar. Earth is set above ye Volatile Alkali. For ye Volatile Alkali if in its mild state with a contains Air will indeed disengage ye Calcar. Earth from ye Nit. Acid but this by a double Elective Attraction as in ye following Diagram.

Diagram

Diagram of N. Ra. Vol Alk. — Diag. 2

Calc Earth — Vitr. — Vitr. — Vol Alk — Calc Eth

The 2 alks are brought together, but if ye Alkaly is into Caustic state it will not disengage ye Calc Earth in ye Vitr. Alkalescentes as in Anag. 2 the Acid having then a stronger attn to ye Earth than to ye Alkaly.

We have now treated of ye Acids as Chemic Elements, whether they are Physical Elem to also we examine whether they are ye ultimate Particles.

Acids certainly differ from each other essentially & are not all composed of one Principle as some will have it. By ye burning Glass we can get ye Vitr Acid by burning coal ye Muriatic &c

The most Elementary substances we know are quite different from one another.

Every Substance by Burning may be changed into ye Vitriolic Acid.

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No 29 Lect: ore of the 25th On the Medical Properties of Fluids.

In treating upon the Actions of Medicines on the Body, we divide it into the Machine & Nervous P.

Medicines must act upon either the Solids or Fluids It is impossible they should upon the Fluids, as their quantity is so great, that any Medicine in the little quantity it can possibly enter, cannot produce any effect upon them.

Most Medicines pass thro' a fermentation before they enter the Blood, Some of the Chemical Preparat.ns are incapable of this fermentation therefore pass off by the Excretories.

All Medicines act upon the Nervous power, Vitae that power wch actuates the Body.

Some Medicines have the property of encreasing, others that of lessening the power of the Nerves.

Medicines therefore can only act upon the part of the Body where the Nervous Power, i e such parts as are sensible, as the Skin, Mouth Fauces, Stomach & Alimentary Canal, & the Excretories.

We come now to the Actions of particular Medicines shew they affect the Nervous Power, & how the Machine Externally applied, as Acid Caustics.

All.

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All Acids if dilated are Astringent, whether Applyd to y Living or Dead Body. In the Dead Body this only happens to y part to wch it is applyd; They also coagulate y Fluids, but only in y force to wch they are applyd, As, If we should open a Vein & pour in an Acid the Blood there would be coagulated. If applyd to y Skin in a more concentrated state they dissolve it therefore used as Caustics, wch is y only way we use the Concentrated Acids Externally, but not much used now not being good Caustics because fluid, hence spreading too far, & destroying parts wch we did not intend to touch.

Some have proposed to use the Concentrated Acid & y Caustic Alkaly together viz: first apply y Alkaly & when that has eat away some part & pouring y Patient exceedingly then add some Acid till that begins to eat & then again use y Caustic Alkaly &c. This is a chemical refinement & liable to many objections, as y Addition of y Acid prevents y Dissolution of y part by neutralizing y Alkaly, Besides they form a Crust of neutral Salt upon y part wch hinders y Caustic eating deeper.

The Action of Acids on y Nervous Power is of 2 sorts. 1st They Stimulate the part they are applied to, yet lessen y Nervous power in other parts, acting as Sedatives. as for Example Opium when taken by the

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the Mouth will stimulate ye Glands & encrease ye Secretion of Saliva, yet lessen ye Irritability of ye other parts of ye Body. It is therefore not peculiar to Bleeds to stimulate one part & prove Sedative to another.

They act also as Astringents of ye Solids, this we have said they also do in ye dead Body, but then it is only to ye particr part to wch they are applyd. But it is not so in ye living Body, they rather lessen affecting ye part they are applyd to stimulating rather that particular part and, being Sedative & Antispasmodic to ye whole System.

We shall now see in what Diseases these Intentions are required. 1st For ye cure of Diseases they are applyd to yt intent, as in Strains of ye Ligts where they are too much stretched & relaxed & ye parts pained & swell, Adds take off this proving Astringents to them but it can't be by their acting immediately upon ye Ligaments, as they must be absorbed & pass thro' ye Course of Circulation before they can get at them; and for that purpose might as well be taken into ye Stomach.

The 2d Use is to ease ye pain by taking off the Spasm. Pain we said is owing to more Blood being forced thro' the Vessels than they can easily bear. They take off the Spasmodic Constriction of ye small Vessels, & ye Blood passes. As it is by their stimulus that they take off the pain the best method of applying them is by Cupping, or in ye hand or foot a Cath, wch must have better effect than any just applyd on ye part.

[illegible]

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Blisters therefore according to that law in y Consolution
in stimulating one part will take off a stimulus
from y adjacent parts.

In y Palsy in wch we have said y Nervous
Power is almost destroyed in y Paralytic part, the Nerves
acting in lessen degree. The Cure is by stimulating
y Nerves to bring back their wonted & make them act.
Medicines have been applyd for this purpose as y
Oil Vitriol w & Spirits of Olives but Physicians
say if it does not take effect upon 2 or 3 applns
should be let alone for tho they stimulate y part yet
they destroy y Nervous Power by their Medicinal prop.
whereas we want a Medicine that may stimulate
not only y part but acuate y whole Nervous Power.
to answer this intention, Alkalies, Blisters,
Sinapisms answer better than Medicines —

Inflammations we said were Spasms
of y Arteries & Veins of y part. to take off wch Medicines
have been applyd but there is this Disadvantage
attending their use. That in Inflammations from other
causes as where y Inflamn is very great, as it is
observed that when y Nervous Power acts in the
greatest strength it is most easily exhausted &
with appearances observed upon y
Man Medicines be applyd to such Inflamns they
are pernicious, as being Medicines they destroy &c

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the Nervous Power, as also does Opium the which means they bring on Mortification; & all Narcotic Medicines have ye same Effect.

Tho they don't answer in violent Inflammations yet they are applyd wth good Effect to slight Inflam^ns also at ye End of Inflammat^ns or in such as rise from an External Cause as in Bruises they have Excellent Effects. In Anginas also & Blood-shot Eye; Fractures. In Inflammations Acids must act by taking off Spasms, for if Inflammation wch is owing to Obstruction, short^ne Acids wch are Astringent certainly coagulate ye fluids take off ye inflammation, Hence their Application to Inflammations though advised in ye Boerhaavian Theory tho not in ye Practice. Tho they have had Effect in most Inflammations it should not prevent suppuring them in little ones, as ing Eye Fractures Strains &c, and in this way they act as Sedatives taking off ye Spasms. These are all ye Diseases in wch they are applyd Externally.

The Next Stage in wch they are applyd is ye Mouth where they meet wth ye Animal Fluids as Mucus, & meeting wth ye Sensible Secretory Gland they stimulate them & increase ye Secretions. Meeting wth ye Mucus they seperate the Air from ye Vessel parts, as ing off the Tongue and Mouth

first

first of all they coagulate ye Chyle, & at ye same time by their stimulus occasion a thin Water to be separated below by ye mouth of ye Intestines are raised, but they should not be used where they stick very fast least by the force in acting on them cause Illeus, but are useful in slight ones —

Bleeds taken in by ye Mouth stimulate it and ye Fauces. Thirst is caused by the want of secretion into ye Mouth & Fauces, Bleeds therefore by stimulating will encrease ye Secretion & allay thirst, hence given in fevers where likewise they are sedative, & also in Dropsies where they allow thirst but don't encrease ye quantity of ye Fluids. Sometimes they are used as Caustics in their Concentrate State, where ye dry Caust.s can't be applyed, the Vitriolic acid Concent.d is ye best for this purpose.

When applyed to ye Stomach the 1st effect is their stimulating quality, hence often given to encrease Appetite as any stimulus does but does not bring on a Nausea. Smells also stimulate ye Stomach but they bring on a Nausea. Bleeds therefore useful to answer these Intentions, & should be given a little only before eating as they act only by their stimulus.

One Universal Property of Bleeds we forgot to mention yesterday, is to destroy Fermentation; from fermentation in ye Stomach we are apt to have Eructations, Flatus, Bleeds good here as they stop Acetous fermentation

Bleeds

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Acids prevent an Acid being generated by the Vinous Fermentation in the Stomach, as in Chlorotic Girls that eat ripe fruit an Acetous Fermentation will take place, but not unripe ones prevent this acting as other Acids, for they therefore much desire the Stomach engaging those thing which are good for the Digestive, here that are hurtful.

We also give Acids to prevent the Putrid Fermentation in the Urine &c. When a great quantity of any Fluid is secreted from any part this ought to become Putrid, as we see in Salivations, also in Catarrhs in which it often resembles that discharged from Gleets hence the Phenomena may be decided. This not in most Secretions except the Semen.) so also in Diarrhoeas in a Purging when long continue is apt to become Putrid. In Catarrhs Acids may be of service but in Dysenteries they stimulate too much.

Acids take off the sensibility of the Stomach to Medicines or stimulate to create Nausea hence often given with such Medicines, as with Vitre for Dram: in the Pharmacopoeia Nitrum Vitreatum. but this is an uncertain method as we know not the quantity of Acid combined with the Vitre, it is better wait therefore to give so many Drops with the Medicine.

Acids as most Medicines do exert their Effects on the Nervous Power. To produce these Effects need not be applyd to the Fibres of the Nerves but to impart to the Body, and Stomach in which they

remarkably affect, & by this remote Discourse which is very Aerodox & may be looked upon in this wayes & Common Sensorium of ye whole Body, as does Bath & Acet & Opium which tho' the Effects of Motion yet its removal Effect is on ye Stomach —

Acids are often given in Fevers to take off the Acrimony, diminishing the Fevers Power, by their Sedative qualities when applyd to ye Stomach & so diminish ye Heat & lessen ye Pulse & not by any cooling Quality wh they possess, as we have shewn that Acids when joyn'd wh ye Fluids generate Heat, and they can't do it by their Stopping the Circulation for they have their effect before ye Coagulate is much altered. —

They likewise by this their Sedative Power stop Hæmorrhages & not by going thro' ye Circulation & there are ye 3 instances fore wh we give Acids wh ye Coagulate ye Blood its true when applyd act yet don't we act in Hæmorrhages will Acids be all coagulated in ye Veins, neither is it by their Astringy upon ye Coats, as they are given so small quantities but when mixed wh ye Blood, they must be so much diluted by Aqueous liquors to have little Effect as dn ye a Ligature of Silver wh contains ye 1/20 of ye Filtrate Acid, no more or less. But in the Urine there is only ab 3 gr. of Acid, and as all Acids contain much later half ye 3 gr is Water, 1 gr so therefore can only be contain of Concentrate Acid & how can this effect ye Constitution but by its Sedative Quality. Yet they

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they upon the action of ye Heart & Arteries & of more a Fergo, having the same effect as Bleeding, by wh means ye Acrimonious Particles act wth less force & ye Blood moves slower. This is their Effects on ye Stomach.

When they get below ye Stomach they meet wth ye Bile in wh they make a Separation or Precipitation change it into a Green colour called ye Porraceous Fugacious Bile, likewise they give it a sweet taste and have their own Effects diminished. If they could be applyd in any quantity to ye Intestines they would purge. The way they act most powerfully in this dilute state is stopping Fermentation the 2 or 3 grains of ye Vitriolic Acid in Turnes wine stop ye Fermentation of a whole Hogshead of Wine.

The Pleurisy is a Putrid Fermentation in ye Juices of ye Body, Acids themselves wonderfully wh can only be done by Acescents, & Fruits, Acids not being able to get into ye Blood in sufficient quantity.

The Acids don't here cure ye Pleurisy this eddent they don't act upon ye Blood, & they can have no action upon ye Arteries wh are insensible to a Chymical Stimulus. The small quantity of Acid wh goes into ye Blood tho it can't cure ye Pleurisy by its Fermentation, yet being dissolved in ye watery Particles of ye Blood & the Water passing off by ye Skin & Urine ordinarily ye Acidness of ye Acid is carried along wth it

and.

and this Acid being now more concentrated, will by its stimulus increase ye Secretion, hence Acids are Diuretics & like other Diuretics sometimes Diaphoretics, but this should seem they would not so easily be as ye Glands are so numerous & ye Acid entering ye Blood in so small quantity as is seperated into these Glands & diffused thro' ye whole it must be so dilute & in such small quantity as not to produce any Effect by its stimulus.

As Acids act upon all ye Glands they may also prove Pectoral by increasing ye Secretion in those of ye Lungs & so cure Coughs, this is evident in ye Muriatic Acid wch is ye least change by entering ye Blood as ye Constitution rather generates ye Muriatic Acid than any other and this found in all Animal Substances as we mentioned when we spoke of it particularly & is got in form of an Ammoniac, joined wth the Volat Alkali.

Wth regard to ye choice of Acids, ye Dr has been able to make little Distinction, they in general seem to differ little in themselves but in being more dilute or Concentrated, however as an astringt ye Vitriolic, Nitrous & Muriatic appear to be Diuretics ye Muriatic & Vegetable are ye best.

Acids differ considerably wth regard to ye substances mixed wth ye ent as ye of Vitriol has a fixable Acid wch is antispasmodic, & ye more so an Essential Acid wch is very agreeable to ye Stomach, used therefore in Nausea & loqueness of ye first

Lect^re 26 On Alkalies —

The Essential Property of an Alkali is to combine with an Acid into A Neutral Salt.

The Essential Property of each particular Alkali is to combine with particular Acids into particular Neutral Salts.

There are three Alkalies The Fixt Vegetable Fossile & Volt Alkali.

The Mild Fixed, The Fossile and also the Caustic Alkali can be united with Acids into Neutral Salts of a Solid form, but the Volatile can't.

All are capable of Crystallization and the Dr here shew'd us Examples but these are all Salts to contain a quantity of Water. The Fixt Vegetable is said not be Crystallized, but may be done, as Dr here shew'd us the way could be done not to check it Dr. First of the Fixt of the Fixt Vegetable Alkali

The Fixt Vegetable Alkali is not found in the Fossile or Mineral Kingdom, not to be expected in Mines or Mineral Waters. never found in Vegetable or Animal Substances, but is always produced by an alteration of Vegetable into Ashes, but whatever Calcination takes place in the Vegetable, this formed before by fire but is not present with in the Vegetable.

Not

Menstr[m]	Solvend	Means of solution & Appearances	Result	How substance evaporated
Fixed Vegetable alkali Kali	Sulphur	[illegible] solution is [illegible]	Hepar sulphuris	
	Inflammable Spirit Oils ~~Alcohol~~ Fixed Oils Animal Vegetable Substances	Caustic alkali Boil & Heat. Separating formed by a Neutral Salt.	Soaps	
	Metals	Dry solut[n] in their Calces Fused Solut[n] in their Calces	Oxides Some small part of them is oxydated.	
	Crystalline Earth	Dry solution	Common Glass	
	Other Earths	Dry solution	Brake Glasses	
	Water	Attracts it from the Air or by Deliquescence	Solut[n] of fixed alkali Sal Tart & Derginum	
	Alcohol -	Alk Caustic Magnesia	Fumed Sal Tartr acid of Soap Fumed Antimonii	

Nor is it ever found in animals tho' they eat wer so much of it, it being destroyed in y Blood. It is produced in y ashes of vegetable substances, or in y Residuum of y Juices of Plants after Evaporation.

It may be made from them even after the Vinous or Acetous Fermentation as in Tartar and Lees of Wine. It is procured also from y Residuum of Urine after Evaporation of Mass which ~~left~~ be burnt. It is never found in y ashes of Animals after burning nor yet in Fossiles. Hence if we obtain this Alkali we may be sure y substance was Vegetable & not Animal or Fossile. tho' it is easily thus made yet it is at a great Expence only made in a great quantity, & therefore brought hither from Russia land & Poland but easy Charcoal is a great advantage to y Country where it is to be burnt.

Tho' it may be produced from all kind of Vegetable substances yet in greatest quantity from y Lees. It is never to be made from any of y Fossil Terrestrial as Stones, Earths, & they contain much less. The harder the substance y better it because they contain more Matter & yet generally contain more Oil hence consequently more Alkali is produced, it wine produce that Alkali which is a composition of y Alkali. It is best to burn y Blood immediately lest it putrify as that spoyles y Oil.

It is

It is necessary to burn an quite to chars alone w:
a pure lightfire a close one producing charcoal,
from wch Kettle Alkali can be obtained but if fire
should not be very fierce or in tall chimneys or too
large Pits or Stills a that may cause a consid
Ashy Salt Pits should be very out together and
of Wet Wood are better also for this reason that they
burn more gently. After burning potash is to be
cleared from ashes & from a small quantity of
Vitriolated Tartar wch is generated then to be purified
by filtration in ye Cure way of best method
lately Alkali attract Water from ye Air in its ye quantities as then can
see if Salt has this property. And we should always
let ye Salt do this especially as we must not use
warm Water wch would dissolve if Vitriolated Tartar
wch is soluble in only a small quantity in cold
Water. After this are fitt to pour Water upon
them & filtre thro flannel bags wch makes them
pure enough for ye common Manufactures, yet
if they contain some Salts, they should then be
evaporated as in ye mak of Commn Salt only in a Iron
Pane. After evaporating a part of ye Water more of ye
Salts will be got out of ye Pots, the Experiment of
Fuchs nothing as wood may be used in wise
produce more Salt. Towards ye end it should be
dried in Iron Pans to prevent ye Salts sticking
to ye Pots. The Reflection in this work is ye Ind
10000 Tun to ~~supply~~ Sweden

affords

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afterwd: Salts put upon Ashes. No Substance being
used in more Manufactures than Glass is Glass
making, Bleaching, Soap &c &c

as we are not nice into Preparation it is impure
we must search it more for Chemical & Medicinal
purposes wch is done by dissolving in Cold Water filtr
and Evaporat it. For some Purposes it was
wont Customary to make it from Nitre, Tartar
Wormwood &c but these Salts rather from ye obtained
from Potash wch is generally purer indeed ye not
of Wormwood only differs in being Brownes.

The Operation in making it from Tartar is by
mixg ye Nitre w ye Deflagrating of ye Vegetable
oily Tartar flying off w ye Nitrous Acid leaving ye
Alkali of Tartar.

Chemists for particular Purposes, we are
obliged to get it from Nitre wch yields by deflagration
w Charcoal an Alkali perfectly mild tho fully
saturated w ye Air.

Effects of upon Caustic Alkali we pour the Concent.
Mineral Acid they unite without Effervescence into
a Neutral Salt yet dial Diurel Electri whereas the
mild has a considerable quantity of Air separated
by adding ye Acid, hence when we want an Alkali
perfectly mild without any Caustic we obtain it from
Nitre. This Salt is being fully saturated w ye Air is not
fixed Vide Hermans — ye Charcoal & Nitre are pour
it thrown into a hot Crucible ye deflagrate leave ye Alkali
ye heat ye intense

The

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The Alkaly is now reposited in Water filtered & evaporated and in evaporating it we may either have it in Crystals or Dry, we may have it in Crystals by evaporating it till we find by cooling a little off it Crystals shoot, and Dry by longer contin. of evaporation.

The Mild Alkaly is not fit to dissolve oils, make Soaps or eat Animal Substances for wh purposes it should be used in its Caustic form. The way to make it Caustic is to deprive it of its Air. Let us only imagine of Air to be a Menstruum as an Acid & then consider how to obt. the Alkaly free from it, we shall find it may be done by destroying of Attraction by means of Heat or by an Elective Attraction, but of former requires a long burning of Operation going on slowly, as it melts and then boils if too great heat is applied. Also when made fluid by fire is less apt to seperate its Air, a gentle heat is therefore required but to melt & continual stirring wh makes it too laborious.

An Elective Attraction is of best way of getg it. Fact Air attracts Calcarious Earth stronger than it does of Alkaly therefore a solution of of Mild Alkaly & a solution of Cale Earth wd attract of Air and of Alkaly will be left bare. The Cale Earth should be without Air as in Lime in wh of Air is forced off by heat.

Water

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Water should be used to make 'em fluid or else the Alkaly should be melted. The more simple way is to pour Water on em in y Cold. & in order to make it perfectly Caustic to one part of Alkaly we add 8 of Lime then pour Water on them cork y whole close in order that it may not attract any fixt Air from y Atmosphere, & after stand 3 or 4 days the Earth & Air will be united into a Chalk and the Alkaly left Caustic, &c

In this manner we have a Caustic Alkaly but unlike w th a considerable Quantity of Water, for Caustic we want it dry, for w ch purpose Evaporate it therefore but there is this difficulty attending that in y Operat.n it attracts fixed Air from y Atmosphere so as to make it less Caustic, to make it perfectly Caustic we add a small quantity of Quick Lime in powder to it when nearly rid of its dryness ch is attracts what Air y Alkaly had got from y Atmosphere. The Dispensatory orders y Alkaly to be melted for use & rack'd up into long rolls but it is not then so Caustic as when dry 3i of Lime will be suffic.t where a pound of fixed Alkaly is used

If much Lime has been used we shall have some of it (as Caustic Lime is soluble in Water) form a crust on y Top during y Evaporation. but this advantage attends much Lime, that it attracts y Air before y Alkaly can. To judge of an Alkaly being perfectly Caustic add an acid if effervesces it is not perfectly Caustic.

There is

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531 There is another way of making a Caustic not easily explicable. It is this

℞. a Reg. of Antimony (wch contains Sulphur or Phl.) & Nitre ana ℔ ij mix em in Mortar and throw em into a hot Crucible and ye Nitre will flye off together leaving ye Alkaly, a fixe Caustic Antimonii.

Is this from Metals attracting fixed Air sooner than Alkalies do. The Air is drove off by the Heat generated. That there is fixed Air in ye Regulus Antimon is proved by pouring Aq. Regia upon it, by wch we have an effervescence. Yet ye Regulus attracts ye fixed Air stronger than ye Alkali does, ye Regulus being deprived of its Air attracts ye Air of ye Alkaly leaving it Caustic, this Deflagration is very slow.

By this means we can easily make a Caustic upon ye Spot wch occasion before we could do it by other way, the Alkaly is to have Water poured upon it wch Water wont dissolve ye Caustic & then ye Solution must be evaporated. We should rather make use of too much Regulus that we may be sure of having a Caustic. The Tinct of Antimony prescribed low made as this process is only a solution of the Caustic Alkaly in Alcohol wch easily dissolves it.

Sect. 27.

Yet we find in the last of Chym: Dist: of the Fixed Alkali, its Effects on other bodies, & of its Alkali.

The Vegetable Alkali is to be obtained from Vegetable Substances, once dry yesterday, even after they have undergone the Fire or Violent Fermentation, but not Putrid. The Colour of Vegetables and Alkalies or ashes of Vegetable and Animal is very various sometimes we have them white sometimes Brown sometimes a green, this Phenomenon we can't pretend to account for.

Change of Colour is the most difficult to understand & least known of any in Philosophy.

The Alkali after Fermentation should not be melted nor suffered to attract the free Air, Fixed Air, Atmospheric Air. Solid Bodies in being reduced to a fluid state attract Air. Fluids in being changed into a Solid form lose part of their Air. Dewe also see in Water and while freezing throw out part of its Air.

The Specific Gravity of the Alkali is not easily to be determined.

In a Solid form exposed to the Air it attracts moisture from the Air as the Chemists call it Deliquium and it is of no consequence to expose this or any other Alkali to Water till the Water will dissolve no more is as good as one. The dried Alkali is capable of Crystallization as any Neutral Salt, as Kamenis here shewn.

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The Mild & Caustic Alkali differ greatly in their effects on bodies. The Caust.c is to be looked upon as an Alkali, but y Mild being saturated w.th Air is rather to be looked upon as a Neutral Salt.
Both y Alkali is easily united w.th Acids, & form Neutral Salts exactly y same from y one as from y other, only Air is seperated and an Effervescence in y one case.

In its Caustic Form it dissolves all Inflammable bodies, as Oils Alcohol &c. In its Mild it does not except Sulphur. y Alkali has a greater Attraction for Air than for any other &c. On this principal depends y making a Soap & in manf. Soaps y Alkali should be used as Caustic as possible.

Exp.t: If upon Oil a solut.n of y Caust.c Alkali is poured & set on to boil a soap will be formed. The Process in Dispensatory is very injudicious as the Ordinary weak Solution, also in Boiling it attracts a great quantity of Air so that it gains a great quant.y of Air before half y Oil is dissolved.

Exp.t: If y Mild Alkali is poured upon Oil it won't make a Soap. Nothing Solut.n therefore y best and y more Caust.c y Alkali y better. A double quantity of Lime not necessary equal parts will be sufficient if letting them stand together long in a mean time don't need so much Water to lixiviate them if y Alkali is more Concentrated.

Exp.t:

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Exp.t. Sol.n of Wine poured upon y.e Mild Alkali, the Alkali attracts y.e Water of it in y.e Ext.r but is not dissolved hence y.e Method of obtaining Alcohol free from W.r by distilling this (Alkali) But a Solution of y.e Caustic Alkali easily dissolves in Alcohol and forms a kind of Soap w.ch may be obtained in a dry form by Evaporation or by common Salt, but a Solut.n of Mild will not be dissolved tho' it at first appears a little mixed but soon separates.

Both y.e Caust.c & Mild easily dissolve Sulphur into w.ch it is called Hepar Sulph: but Caust.c dissolves it in different ways. The Caustic when dissolv'd in Water easily dissolves Sulphur, but y.e Mild Alkali requires to be fused & then y.e Sulphur added will unite w.th it, likewise when y.e Alkali is united w.th Air which it has y.e greatest attraction, it won't unite so well w.th Sulphur

It dissolves a very small quantity of all Metals. Copper it dissolves y.e most. And in mak.g Exp.ts on Mineral Waters to discover what they contain, no more Alkali should be added than is just sufficient to precipitate it otherwise it will dissolve y.e Metal. This is a Rule in Precipitation never to add more of y.e Precipitant than is barely suff.t

In a dry Solution (fused via) it dissolves the Calxes of Metals into Glasses hence call'd a Flux, but y.e Metals must be calcined first otherwise it will prevent their Calcination.

In

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In a humid solution it has no effect on earths but in dry one will dissolve em into Glasses. Hence the foundation of Glass-houses. They melt y Alkali & mix wth it Chrystalline Earth or Sands.

With Clay it makes a Glass not transparent, but of a Hyacinthus colour, wth Absorbent Earth it makes a white. The Mild has no effect on Terrestrial or Vegetable Substances, but in a Caust form will dissolve em. hence not uncommon buy Soap Works for a Slave to fall in & be perfectly dissolved so that they can see nothing of him unless a metal button or two wth he has perhaps on his Coat. The Alicant soap that we eat we often eat a little Mumie.

The Elective Attract.n

It has a stronger Attraction for bodies having any thing except Phlogiston wch unites wth Adventitious volatile Alkali. Therefore it precipitates all Calcs & all Metals from Acids but not in their metallic form unless Calcs or Powders, but w Colour differs greatly according as y Alkali is more Mild or Caustic. Hence y foundation of y various Precipitates. Instances for Exp: If to a Solution of Mercury in the Marine Acid we add y Fixed Alkali a white Solution a Brown Powder is precipitated wch is darker when added wth y Mild than y Caustic Alkali as y Pure shew us. but what y reason of y change is, is uncertain. With y Volatile Alkali a white Powder is precipitated wch is lighter wth y Caust Volat than y Mild Vol Alkali.

Alkalies

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Alkalies precipitate all Metals but in diff.t Colours hence ye Foundation for ye makers of Prussian Blue. it is a Solut.n of Iron in ye Marine Acid precipitated by a perfectly mild Alkali.

The Fixed Veg. Alkali, has been only lately found out, yet we are better acquainted w.th it than ye Fossile w.ch has been long known, & was formerly used in mak.g Glass. & is still used in ye Mediteranean, and we also use it in this Country.

The Fossile Alkali

Is found native in its pure form & Crystallized in some parts of Asia, & in its Combinations. In Egypt it was used to be whole Tuns of it found. hence called Egyptian Nitre. The french call it a Mineral Alkali tho improperly, that term should be applied to Mineral Substances.

The Way that Glass was first found out was by some Traders in a land carry.g Nitre from Egypt into Greece who accidentally making a large fire on the Sea shore w.th this it was found to melt & Vitrify & into Glass.

There are no Mines of it now found any where, but it is found frequently in Mineral Waters, but as it attracts Acids stronger than other Substances it precipitates them.

It is found in considerable quantities in three Combinations, as Glauber Salt, Sea Salt, & Borax. The Glauber Salt is seldom found Native.

This Alk.

Mercury	Solvent	Means of Solution &c	Result	Neutral Salts general
Fixed Fossile Alkali Potash	Sulphur	Dry Solution	Decomposition	
	Oils Alcohol	Caustic Volatile Boil & Heat	Ether	
	Metals	Dry Solution w Metallic Calces & Fusion Solution w Metallic Calces	Glasses } Dissolves a proportionable quantity	
	Earths	Dry Solution w Crystalline	Glasses Compound Glasses	
	Water	Addition Does not attract it from Air	Solution of Fossile Alkali	

This Alkali is found in great quantity in the Muriatic Acid which is the most universal thing that can be, and also in Vegetables which is not so there. It is also got from Ashes of Vegetables by many Dyes in those Ashes without being destroyed which shewes the Acid and Alkali to be all having of Alkali which is called Kelp in the Levant Trade; & in Italy Rochella, in this way it is used in Glass & Soap making, but is little used by Chemists yet we shall describe the process of obtaining it.

It may be got from Ashes which however contains much Common Salt. We pour Water upon them hot & evaporate & Crystallize the Sea Salt which is to be done by pouring off, and evaporating further the Lye of Ashes & Crystallize. It may be likewise got from other Substances, as Sea Salt, the most simple method of getting it from which is by distill. the Acid by means of Heat, but this is not so easily done this way, as it is by addition of another Substance, as Calcareous Earth, by which the Acid being disengaged is drove off & Alkali unites with the Earth into a Salt. But the best way is by add. the Nitrous Acid which has greater attract. with the Alkali than the Muriatic, and then it is to be distilled & the Phlogiston which carries off the Nitrous Acid. When the Muriatic is separated from this Alkali the Nitrous united to it into a fixed Nitre. Next way of deflagration is by powdering equal Quantities of Nitre & Tartar together in equal Balls not equal weight commonly as to have the Mass flat, & Crucible should be

spells that but not so much or least part of ye Alkali
be exhaled, & ye residue is table chalk in ye fixable
state, letting ye first be perfectly calcined before
you throw it more. After ye calcination ye black
mixture is to be boiled into ye water, and does not
attract moisture from ye air in so considerable
& is then to be filtrated evaporated & crystallized
& differs but little in its properties from ye fixed Vegetable
Alkali. So considerable is ye difference that
salt is thereby & its fixability & contrary
to ye Vegetable it yields in ye fire.

It is to be made caustic as ye other is and if
we should have it dry we must filtre & evaporate it
& exhaust in all ye liquids as ye Vegetable also does
nothing to each in a fixt Neutral salt as we see in
ye table of Neutrals. There is something very particular
in these salts formed by these two Alkalies. The one
that attracts moisture from ye air & ye other in ye
air, but these Neutral salts have most of contrary
qs: shews that ye properties of ye compound differ
from those of ye principles of ye ingredients.

All ye salts made by ye volatile Alkali are easily
soluble in water, & attract water, of wch they contain
a good quantity.

The effects of this Alkali on other substances
are nearly ye same as those of ye fixt Vegetable Alk.
In its fixt form it joins to oils in soaps, &
most of ye medical soaps are made of this Alkali
wch however are not so easily distinguished from those made
of ye Vegetable

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N°32 A dissolver Sulphur into a Liquor, and this wth Alkali that we have nothing found in Mineral Water. & dissolves all Metalls in ye form of Calces. & dissolves Earths into Glasses, & all ye Venetian Glasses are made of this wch are however no finer than ye English ones wch are made wth ye Earth Alkali. & dissolves Animal & Vegetable Substances into Caustick but not in ye Mild form. Perhaps it might be an improvement to make Caustick wth this instead of ye other Alkali wch does notwithstanding ye easily attract moisture therefore perhaps w^d keep dryer on the part & not lie so liable to spread further than we intend it. but this from theory only but is worth trying. Any inconvenience attending of Common Caustic is we can't so easily confine 'em to a part being liable from their attracting so much moisture to spread & eat more than we intended.

Lebt^ns

Dissolvent	Solvend	Means of Solution & Appearance	Result	New Substances generated
Pot Athali Sp. Sal Ammon Corn Zero Stal. & Sol Vol Ammon	Sulphur	Sol. Distill. with Caust. Athali	Solat. & Separation	
	Expressed Oils	By Addition & Agitation in the Caustic Athali	Sap: Sol. Expressed Oil: Soap	
	Essent. Oils Alcohol & Spirit Vin	By Dissolut. in Caustic Athali	Sap Sol Essent. Oil Alcohol Spirit	
		By a small Qu. of Essent. & Spir. Oil Spir. of Alcohol is added in the Agitation	Balsamic Juice	
	Animal and Vegetable Substances	By Addition	Thus assimilated into Homogeneous Substance	
	Metals	By Reducing them to Calces either by Calcination or Precipitation from Acids & then by Caustic	Solution & Precipitation of Sol. Athali & the Incorporation Metallic Calces	
	Earths		No Effect	
	Waters	By Addition Does not attract Moisture from the Air	Solution of Athali	
	Alkaline Salts that be Volatil		No Effect except in approaches that are alike Alkaline Nature	

Vegetable & Animal Volatile Alkali.

Chemists now agree that ye Vol Alkali is not a Native but an Artificial Salt, & therefore is no where to be found either seperate, or mixed in ye Fossil Kingdom.

The Alkali requires a small degree of heat to make it volatile viz. less than that of Boiling Water.

The Roots of dry & inflammable Substances yield this Alkali. It is found also joined wth Calcar Earth, wch is supposed to be made from Shells & ye Bones of Fish.

Putrefaction always generates a great quantity of this Alkali.

It is generated from Soots in Vulcanos joined wth ye Muriatic Acid (& ye Vitriolic). It is not destroyed in ye Bowels of ye Earth, as most other Substances are Acids &c: are. It is also found in Soils from Putrefying Matter joined wth ye Muriatic & Nitrous Acids but never by itself. It may be distilled from some Alkalescent Vegetables, ye Fetrid ones mixed wth Linseed or Cucciformis of Tournefort. as Mustard, & by Chemical Analysis. It may be also got by Distill^n from ye Lees of Wine & from Tartar. It is generated by Putrefaction & in all Putrid Matters joined w ye Nitrous Acid much Hot Ammoniac.

It is generated by Animals in ye Juices whatever be their food, joined wth ye Muriatic Acid.

but

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but Fossil & Vegetable Alkalies are distill'd in all Prices. [illegible] quantity is found in y Strong ones in Marine Salt.

It is also got from animal substances in Chemical Analysis. It may be made by distilling a Phlegmatic Acid [illegible]. It is always combined with Phlog: wch we are sure always enters into its Composition as well as Nitr Acid, or Principle, wch is combustible, therefore tho it may be called a Chemical Element, we are sure it is not a Physical Element, as Nitr Acid or its Principle enters its Composition.

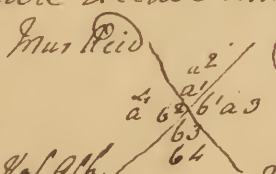
It is much used in Medicine & also in Manufactures, we want it seperated in great quantities from those substances wch it is combined. We get it by y Chemical Analysis of Animal Substances. or from Sal Ammoniac in y first as in distill: by Sal C: wch shews dry to y Sides of y Retort this is very impure but may be purified in some measure by throwing down Chalk & clarifying but this can't be used for Chemical Purposes but is prefered in Medicine on account of the Empyreum. Oil that it contains wch is Antiscorbutic, as y Salt itself also is, but this is too impure, & not so much to be recommended as we can easily add Oil to y Alkali using Lait de Chaux wch is more elegant. The Alkali is only to be got thus in a large way as Also of Animal substances yields but a little Alkali. We have it in great quantities in Sal Ammoniac prod: wch we shall speak when on y Salts, it got also in Soot.

The

The Way to seperate ye Alkali from ye Muriatic Acid in ye Sal Ammon is by means of an Elective Attract^n as we can't do it by destroying ye Attraction by means of fire by reason of ye Alkali's being Volat. To obtain it by an El Attract^n we use Calc Earth, or Fixt Alkali wch have greater Attract^n wth ye Muriatic Acid & thereby detach ye Vol Alkali. This is done by a simple or Compd Elect Attract^n ye former by ye Acid & latterly ye Calcitic Earth or Alkali. to explain this we use

The Diagram as for Seperat^n of Vol Acid.

The Alkali may be seperated by Fixd Calc Earth by a double Elective Attract^n as thus



In ye Cold ye 2 a b's would be brought the Ruler together consequently ye Calc Earth & Air & ye Mur Acid & Vol Alk would still be united, but if Heat is applied so as to destroy ye Attract^n of ye Vol Alkali & Air then the other Ends of ye Rulers will come together. Hence the Calc Earth will seperate ye Alkali by Heat tho not by Cold. This accounts for our (supp^d) prat^n Calc Earth before ye Vol Alkali in our Table of Affinities

Sal Volat^r is made of Sal Volat^r of ye Shops & Sal Ammon thus Crota Air thaine'em & then sublime ye Imp over wth some more Chalk, sublime. The Operat^n is not here shewn because hazardous. ye Heat shd be gentle to hinder ye Chalk from sublim^g wch may be known by weighing ye Alkali

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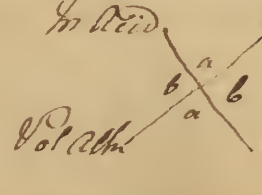
It is separated also by means of Lime, Sal Earth, or Quicklime, by a simple Elective Attract.n of Lime with the Acid stronger than the Alkali does, it comes over Caust.c whereas the other was mild. This Operation we often perform to have the Alkali perfectly pure, but it is not to be had in a Solid form this way but in the state of Vapour except by adding Water in wh it may then be had dry.

The Lime should be dried and 1/11 part added to the Sal Amm: then add the Water, abt 2 to generate Heat wh Lime therefore to be added slowly. For every Pound of the Sal Amm we shall have 8 p of the Vol Alkali in its state; in as concentrated a state as possible. The Receiver is to be luted wh such a luting as the Alkali may penetrate, as Clay & Sand, or there wd be a hole in the Retort least the Alkali come over in too great quant and break the Retort, the Fire should be moderate lest more Vol Alk come over than can easily be condensed.

This Alkali is pure & concentrated in a fluid form as it can be got, it can never be got in a dry solid form unless mixed wh some other substance.

To obtain the Alkali in its Mild form, it may be separated from the Acid by means of the Fixed Alkali either with Caust.c or Mild form, and here another double Elective Attract.n takes place



Hence

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Hence when we want ye Mild Alkali very pure, we use ye Mild Fixd Alkali to disengage it from ye Acid & that it may take place they must both be reduced to ye state of fluidity or Vapour. therefore add Water to ye Fixd Alk to dissolve & pour upon ye Sal Amm. ye quantity of Water we need not be nice in, a good deal what we it is ye Acetot.

In an lb of Sal Ammon there is Bijss of Sal Alk & in order to make ye decomposition Bijss of ye fixd Alkali might be suffic but it is best to use a good quantity, as Equal Parts of Fixd Alkali & Sal Ammon. neither need ye Solution of Alk be pure as the impurities will remain behind in ye Retort as also will ye Acid & Fixd Alkali. As no heat is generated in mixing ye Water here we may add it all at once.

In this Operation ye Alkali comes over before ye Water & shews itself along ye sides of ye Receiver, but in distilling ye Sal Alkali it does not, therefore if we see any in ye Rec it is a sign ye Alkali is not perfectly Volatile, as also is its Pervading ye Acid

The Specific Gravity of this Alkali is not easily determined. no more than that of ye others

The Mild may be easily Crystallized & then contains a considerable quantity of Water.

The Fixd Alkali if taken by ye mouth gives a particular Taste & it is not ye Salts of ye fixd Alkali but of this separated from ye Salts by means of ye Fixed Alkali.

It easily unites wth Acids into Neutral Salts, as were in ye Table: These differ from ye other Neutral Salts as being more easily volatilized, yet they are not easily volatilized as their Principles.

When Mild it has no Effect on Inflammable Substances, but in its Caust. form dissolves 'em all ~~Hence ye Foundation for ye Spa Lowentrum~~

Alcohol precipitates the Neutral Salts from Water. The Vol Alkali when joind wth Air, may be looked upon as a Neutral Salt. When this Alkali is precipitated, wth Alcohol after shaking ye Phial well, ye Alkali is in a Solid form. It will also in its Mild form unite wth a small quantity of Alcohol & Essential Oils, hence ye foundation for ye Sp. Sal Aromatic.

The Caust. Vol Alk dissolves Oils into Soaps such is ye Lin Vol of ye Shops. It unites wth Essential Oil & Alcohol easily even in Solution wch however should be very concentrated, this ye foundn for making Eau de Luce wch is a valuable Medicine.

The Caus. Vol Alkali dissolves Sulphur either in its Humid or Dry Solution making a Hepa Sulph: whose Vapour is excessively Volatile & Penetrating hence if left in a Room wth Lace it makes it black, also if we write wth a Solution of a Metal upon Paper [illegible] this he stick on a wall, this Vapour will penetrate from ye other side of ye Wall, & stain it, it is visible & black.

The Mild Vol Alk don't dissolve Sulphur

Both ye Caus: & Mild Vol Alk: dissolve most Metals when reduced to Calces, & some few as Copper in a Metaline form. But then Air must be admitted

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Exp.t 8 of Vol Alkali in Solut.n is poured upon Copper a Solution takes place, if a Air generated & is blue; but if a Air is excluded (as in the Exp.t) but a Colour of Copper won't be disposed.

The solution by Air gave an more evidence of Copper be in a form of Calx, or precipitate in form of powd.r producing a beautiful purple Colour, hence we may discover Copper in Mineral Waters.

Applied to Earths they have no Effect, as they won't bear suff.t heat to melt a Earth by reason of their Volatility, or else perhaps they might

The Mild Vol Alkali bears no Effect on Dead Animal or Vegetable Substances, but it Caustic does, but then it is by long digestion ——

To morrow a Medic.l Virtues of Alkalies ——

Lu.ne

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Lect^re 4 29 On the Medicinal Virtues of the Potash & other Alkalies

Eau de Luce is made thus

℞ Alcohol ℥ iii Castor Oil or that of Amber ℥ i Oil Lavend. ℥ iss. Liquor Ammon. Caust. ℥ iss. Volatile Alkali ℥ vi M

Medical Virtues of the Alkalies

We shall treat of their Virtues under the Head of Fluids. As Their Effects upon the Machine are and Nerves &c. for what Intentions they are used

The Medical Virtues of the Alkalies differ considerably contrary to Acids. the Fixed & Vegetable differ little. the Volatile differs considerably from the other only act upon the Machine & first Vessels they are apply & Vol acts upon the Nervous Syst. tho both Fixed & Vegetable have the same Effects on the Machine, as Caustic form the Volatile is never used

The direct powerful Effects of Nervous and heart is Chiefly called Stimulus & no Antisplasmodic Virtue

In its Caustic form dissolves all the General Solids, as Calcareous Substances, Sanguineous Serum, Albumen, Fibrous Substances, Horn & other Solids. In its Mild state does not but approaches to Alkalis

That Caustic is applied Dry or in Solution

The Appl. to the Skin in its delicate state is dissolves the Mucous respect by the Sebacious Glands to the Glands are often obst. wh. causes Irritation & inflam.n. If the mucous is stopt up in the Follicle
Bed be guard against dissolving this both dry & fluid it cures these pimples of the face or Breast by washing & throwing them off.
But should not often be used if the body has been subject to the Inflam.ns for a long time disorder this may cause the Mucous to fall on some other part. wh. not being so often as the deprived of Skin of this Mucous to shd defend it the Skin will shrivel & ulcerate
Poisons received by touch will often rem.n imbed w.th this Mucous before they effect the Constit.n as Cancerous Matter or Putrid Matt. in the spect. hence useful to wash y.e hands as it will take off this Mucous which will stick to the hands & not be wash'd off by the comm.n methods so often lives by these methods effect the Disorders.
Necessary also in washing after to wet the Venereal Ulcers: also in the Itch if after touch a part. should be rub'd.
Physic.n hube tho' impossible to cure the venereal Infect. this way but it certainly may lay ferment the Mucus w. other stood by Bad Humors on the Skin ulcerates the part. & thus may taken up by the Lymphatics to prevent this use of this Celebrity is advisable as the smaller skin of Mucus remains entangled in the Mucus of the Glands before it produces the effects

a The Alkali should be of a very Caustick kind, or rather that Alkali after Fixing has only just been added, & before Evaporation with then more Caustick

b: As a hot Iron immediately applied gives less pain upon a whole than one applied gradually

The Mucus is not soluble in Water itself therefore
is not wash'd away, if the Alm: dissolves it
if the Mucus of Glands or Arteries are wash'd
off the Clap may be prevented. the Solution of
Alkali should be very dilute least it occasion
much pain & increase Inflam. 1 ℞: to ℥ii of water
Water will dissolve the Mucus, but the best test
of the Solution not being too strong is to taste it & the
Mth is very sensible. The D. has prevented
the Venereal Dis this way often.

In a dry state or strong Solution is used
to dissolve parts of the Body into an Escher w
is a Slough. In this way we use an different
first to open an Abscess just to scarify it
or to let out Water in an Ascites or dissolve
a Wart. The Lye Alkali is best for this
purpose and should be applied very strong.
away as possible & gives less pain by doing
its business quickly. There is another Case in
w: the Caustic is used as in Ulcers where there is
a great deal of Sordes, Callosities or Fungus
w we want to dissolve off. The Fixed Alk
should never be used as here as it only stimulates
upon the Nerves is just to stimulate & increase
a bad Supp: Best Caustics are those of Metals
w affect the Nerves so as to bring on a good
Supp: The Cs of Mercury as Precipitate &
Silver Drs Wile often cure Cancerous Ulcers
by their bringing on a good Supp: Brown Inf.
as old Alk to Skin is never apply'd to Skin
as perfectly mild has no Effect even in Washes

a: It cannot be conveyed into the stomach according unto the form otherwise to resolved & turned into Chyle

The Vol Alk never to apply to the Mouth but in weak solution, recommended to dissolve the Ulcers & Aphthae in Sucro but is not advisable as its acrimony has bad Effects, however useful to wash the Mouth after washing away putrid matter & taking away the red roots hence may prevent Putrid Fever Dr Harvey Tells of a Physn: who said a drop of a poisonous Matter is produced a Cancer which Dr. Mr. Hewitt & Mr. Patent might have been thus prevented.

Did Natura there is common Ammonia is let loose by taking Vegt Alk wh gives & made rather disagreeable as it stimulates & it may quench thirst but this Vol Alk being let loose prevents this Effect.

Taken into the Stomach Mild & in a very dilute state adding Acid it but is not so proper as the Magnesia Alb as the former stimulates too much. It may act in its mild state as a Stimulus upon the Stomach & Intestines hence may prove Purgative but as only a small quantity do 3 or 6 Grains Kentlie Brown in hence not to be

Can't enter the Blood such much as the Garlic Juices afterwards wh Pancreatic Ducts must contain Alk enough to saturate 55 Grains of this Alk: now than can't dissolve the Blood it can't get further than the Prime Vie and the Secretory, however when comes to the Gall Acid into the Duct Salt of Silo may stimulate the Kidneys hence Diuretic. The Calculus Vesicae Urinaria Calculus Urinaria can't dissolve the Stone but can't get to the Bladder in the State but in Liquid shell or Diuretic Sellers. however it dissolves the Stone and so Dor well

a: Dr Anti[illegible] stomach only acts upon ye part to wh it is applied but over ye whole system as when taken into ye stomach

b: thro' ye whole system except ye parts to wh they are applied

of Plants & Vegetables

diuretics and Lactiferous tribe. They stimulate the Mouth occasion thirst therefore a greater quantity of fluids are drunk which will dissolve & stone and stone the lymphs sheppard in a quantity of Water is dissolved. however if the stone is soft we can by diluting & sharpening the Liquids & by warm heat prevents the encrease or generation

We can't conceive or have experienced that the Alkali affects the Blood, as it is as we find it occurs out of Body by the Lungs or Pores.

Medical Virtues of the Vol Alkali

The whole of its Virtues depend upon its Antiseptic & Nervous Power. It hard same Effects also as the Caustic Alk in dissolving Mucous Membranes but affects Nervous so differ much stimulates the Nervous Porder & therefore Spasms it not only stimulates the part etc appl to but the whole Nerv Sy. as if taken into the Stomach we find a glow over whole Body hence contrary to the Effects of Acids it stimulate the Part but are Sedative to the Nervous System.

Its second Venue is to cure Convulsions Antispasmodic & Anti Hysteric Apply Lam & Ether to a Convulsed Muscle or Limb if Convulsed, or in the Hysteric Fever by applying no Vol Nerv & Spasmodic relaxed therapeutic Descension for ch it is appl to the Stomach the Palsies Acids would were very improper stimulate as they weaken the Nervous Sy. but this Vol Alkali is preferable as it stimulates the Nervous Sy. hence appl as in Lethargy or Drowsy.

Its appl it to Paralytic parts dil should be made, as in the Lin Vol, but here the Caustic

a. $\frac{ch}{w}$ is very proper in Coagulated Bs. determin-

always be used as a Child will not deceive by Oil
half an hr of ye Effects. So also not an improper
Medicine sole applied when we want to excite
Abscesses drawn Drastical Cases & and
particular also in Rheumatic Cases often a
Mucus is collected and Effect Membranes &c
swell & Kings Evil Lues made this fortune
by app this Word Chyes comes in a Collect
of Mucus between ye Muscles & Bone.

It is proper to take off Spasms least not in
inflammatory ones it wd increase. This
Dis: Spasms differs much from ye other as being
from Strength as Children observes agree
we see people in Fevers Convulsed or when
drunk but Spasms are attended wt in
health. This distinction differs so much as
requires always a good Medicine moveable as
ingl Lost of Circumscription. This also remarkable
Abscess ingl Spasms apt to have different Issues
cell & d: in that Cause being Spasm in general
and Autumn & Coldness. Why the Nervous
Power acts stronger at that time we can't
Reason. In all these Indications to remove
Spasms if not all yet not be used of Indication
depended upon a Corrupted Blood no thing could
be better than this Attacks but not appt to
Dis: & always increases imply the Similar
Together is one Dis: in w has the Simples for
virtue as well as Opinions, & their good Effects.
app: of Part end of Indications when Mentioning
to Spasms or Rheumatic Pains — Dr Gouch
Rheumatic Pains — This Attacks is very
proper in these. They are often used to remove these
Spasms certain. & Self Lessons & Diversions
addicted mobile is easily cured

a also increases at y same time y actions of y Heart, as is evident from y Nausea produced by ye procedent Vomitos

b Its effects in these Cases have been experienced as in y Sal Vipers: cried up in these cases but is nobler than ye other Vol Alkalies

Thus far do are to be given

After remov'd of pains such Medicines should be given as ~~[illegible]~~ are proper to the Constitution as Mercurius Antimonialis Rattlesnake root &c

Salivation internally

Often appears in Hysteric fits to be more in which have all the symptoms of a Fever so that it is very making that it will go off thus an Intermittent by sweat, urine or other evacuation but if we apply it and begin as a Fever it will presently take off the whole system & cure the Disease. Also also for a vomit before to stomach.

Used after taking Poisons, as the bite of a Viper &c: have been a part wch is well to be but when swelling is very particular no Inflammation nor of hardness as on Inflammation yet are not unlike a [illegible] very, contracted to the Rheumatic owing to spasms causing a derivation of blood & tension, so an Anthospasmodic is fitter altho' indicated wch may be given also into the stomach in a large quantity & patient can bear no rally as Stone of thin. &c

This to be observed that tho' it takes off spasms yet doth not cure of disposition to spasms but rather increase irritability, hence not to be given to prevent Hysteric Diseases or Fits but only when the spasms are come on. We could wonder and of Fevers we wanted a Medicine to keep up the action of the vessels Poison Venenum given to end off the Fever. Seldom goes further than the Prime Vie as it meets wth Mucosities &c but if it enters Muscles yet when it comes to Nerves will fly off wth other

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Hence Acids can have no effect upon the Blood Vessels or Blood but between the Lacteals or rather the Subclavian Vein & the Lungs.

Of the Neutral Salts

As we have considered the Alkalies we come now to the Compound called Neutral from being neither Acid or Alk.

An Acid dissolved in an Alk. & vice versa the Acid & Alk. impart of their properties to a certain quantity of Acid & Alk. impart of neutralizing in a certain quantity with each other, into Neutral Salts

Neutral Salts some of them Native but most only by Art. Native Salts are simple Chemical Affinities

The 2d way is by an Elective Affinity

A compound upon any Substance which has an Affinity to another Acid which attracts the Acid which decomposes the first & joins with the Alkali

To the Salt upon Acetre of Pot Acid is poured the Vitriolic Acid is forced out & unite. or it may be done by adding the Alk. to a Solution of Acid which is a subtle one which has a less Affinity to the Acid than this Alk.

May be

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a. but it shall not hence ye acid fal were redium into ye
ye acid were when superfl is taken up into Crystalli.n

may be made by a ~~Compound~~ Double Alk as well as simple

Exp: Nitro & Sulphur deflagrates & Nitro is lost of the Sulphur flies off in the form of Nitrous Acid mixed with a Vol Alk and the Redd of the Sulphur which is the Vitriolic Acid combined with fixed Alk of the Mine & have left behind mixed a Vitriolated Tartar: it has gone under the name of Sal Prunella.

Thus we call the salts formed by Simple or Double Acids & Alk: but we are generally improper when made by the Vol Process having more or less of more or less Alkali, sometimes mixed with an Oily or Mucilag Substance to have em pure. when they have too much acid we expose em to fire or in mean while as being Volatile flies off & Neut Salt remains fixed

When the Alkali is redundt: we can't do it this way as the Alk is assist'd with the Salt: we do it here by Charg the Alk as the Alkali & the Salt cannot be contain'd in a small quantity of Spt: mixt in each other & the Salts hook lead of Spt: &c

If the Salt is made of Vol Alk: as of Sal Ammoniac Salts we can easily have an excess of Alkali flies off, Exp: as in Sal Nitr Amm we saturate the Acid with Vol Alk & put in a little Alk after the effervescence is Alk in Vapor flies off. It is better to have too than too little Alkali as this is easily separated

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We seperate ye Oil from ye Neutral Salts by
being soluble in Spirit of Wine or &c.

To seperate ye Oil from Oily matter we force off
ye Oil allered wch is gone off by ye help of Alkali
in such a degree of heat for such a account as
a Volatile ye Oil be dissolved from
We seperate ye Oil from Mucilaginous
& Gummy Substance as is common in Sugars
We wch precipitate this Crystal^n a Allegrach
Lime & potashes this Salt Crystal^n Nitro may
be more easily gotten from ye Mucilaginous in ye first
g^ds & Salts where ye Alkali is fixed

As they are Comp^d may be decomp^d by
other Spec^s of Acid formed Salts or may be decomp^d
by destroying ye Alkali by fire
or by an ye Att^n or by Deflagrat^n wch Nitre
is called by Grat^d Alkali wch Phlog: & so can
decompose on all if they bear fire wch Vitriol
may both ye Acid & Alkali
~~Bydes: & Acid or Alkali~~ wch are Chem^l not
Phys: Therefore may be destroyed and by
destroy^g ye Alk: we convert it into a Magnesia or perhaps a Lard only

The Neutral Salts are very numerous, but
shall only treat of ye 12 made by ye 4 Acids &
3 Alk: Pot Soda & Volatile upon Exam^n is such
made wch ye Vegetable Acid Tartar ye 12 Salts are
as in ye Table: besides ye 12 we shall treat of
Borax shall also consider ye union of ye
Natural Vegetable & fixed Alkali, as divided in Medicines
under ye name of Neutral Principles, and consider
A Polych of Mr Boyle

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The 1 obst. Salts that we shall consider in
this Paper are made by ye Vitriolic Acid & fixed Alk.
can never be found Native either in ye Bowels of
ye Earth or in mineral Waters as it Vegetable Alk.
is only got in ye Ashes of Plants & consequently
by order of Earth. This Acid & Alkali have
a greater Attraction for one another than any other substances
& hence often found in Decompositions
have several Names as Sal de duobus
Sal Polych: Brunel: & often ye in Operations
as in Distill. of Stills Acid of Nitrum
Corr. Vegy Acid when we use ye Vitr for these
purposes. So upon mixing often of Oil Vitr
Acid with ye Fixed Alk. to decompose
ye Oil this Fixed Salt is got: also in ye Sp. Salts
when we precipitate ye Spirit: or in precipitated
Cinnabar. We have it in Precipitating metals
when they are joined to ye Vitr Acid, & the add. ye Alk.
We shall be sometimes for double ye Alk.
as in Deflagrating Nitre, or Antimony
with Alk. Sal also in other processes.

From all these Oper.ns have diff. Names given to
Polychrest, Sal Prunel, Sal of Metals by ye Fixed
Alk: have also cap in plenty in Distill.n
of Nitrous Acid & Recovered out of Vitriolated
Tart. which however contains some Acid & Nitre
to separate ye we expose it to ye fire in a Crucible
and ye Acid ascends in yellow fumes, after ye
Acid is gone we dissolve & separate ye Salt which is soluble
in 20 times its Wt. Nitre in 6 times wt therefore
don't Evaporate till ye Water

a. whilst it Salt does not partake the necessary quantity of Water

This salt crystallizes into the consistence of a double
rhomb. this basis united with consistence
so that the salt none chrystallizes 8 sides but exposed
to the air causes to be obtd. which very laborious
perfect chrystallisation. the salt evaporated by
themselves in the sun or a Garrett in a month 3
grains. at the only is 105 degrees. exposed to the
& superfluous moisture flies off in the Nitre
salts differ much from each o
Tis not soluble in Alcohol. has no effection
Coals, substances, called it. substance they are mixed with it
& exposed to heat & fire & fully effed.
Deposites a smell & variety of the Metals
no effect on Earths in solution but in fusion
neither a m in a Glass
Spirit be decomposed by a double
attn add. another acid combd. to a of the Metals
this salt noticed in an Mineral one. Bred
its virtues often we come to those of the salts in
The second of the salts is the Vit Acid & Fixed Alka
united in Glauber salts as both of principles are
found Nitre is also in the Comp. but generally
only in Mineral Waters in which it is found by
acid more like and the attn.
Spirit be decomposed by and a Attn
& then distill from a Retort if any quantity
and distill off. this acid is done by an
equal Attn. yet then contains some of the acid
& a considerable quantity of the alkali to separate it from
the alkali we put the mixture added from
to separate it from salt we strike
one at a diff. oper.

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a. d'où est nourri leurs Water

Sea Salt is as easily dissolved in Cold as in hot Water.
put the Salt into Water & boil it then [illegible] off and [illegible] dissolved as much of Sea Salt the Liquor will [illegible] can then pour it into another Bason let it cool Decently lay in the mouth of the Salt is at the bottom of the Vessel & the Salts will be found in Water [illegible]

The Crystals have to be gotten not easily destroyed [illegible] from Epsom salt or Glauber Salt is often sold for it [illegible]

To distinguish one from the other tho their Crystals are similar, dissolve the Magnesia Salt & add fixed Alk. in Solution & Crystals will be precipitated.

The Epsom Salt ~~that contains~~ [illegible] Salt only a-
The Sal Glauber [illegible] & called Epsom has been made it after been taken for Nitre in Secundum Min Waters and Dr Shorthouse done. The true Salt contains in ten Oz: Qui 16 gr. [illegible] Water [illegible] must be great to purge. The Purgative [illegible] generally to Epsom Salt so soluble in 3 times its weight of Water and to the Cases of Water constituted into Crystals the Sea only Salt attract moisture to become as Water. Fixed by calcination or Nitrated Alk. [illegible] of Metals in which manner they are [illegible] in Min Waters Don't dissolve Earth.

The principle use is as an Antiphlogistic Purgative

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Lect. 31 On the Commonly called Nitre.

Nitre is a salt of very great use, but not so much used as it should be, because it is not then used only in small quantity, but if more Red. by a Dr. Lister called it to the contrary to Dr. Shaw's mention Nitre Cubic and first in all Salts.

Common Nitre never found in the Sea of Dr. Lister the Acid or Alk. compos. these are never found there is always made by Art, neither Acid or Alk. ever to be found in Union or Neg. Subst. tho always made by first making the Acid & then add the Alk.

It was not known till the time of Arab. the Chem. begin to flourish, is made most in East India.

All Aut. agree that it is found in East India where it stagnates Spontaneously or in Putrid Mat. left by the Regulating Camp.

The Quest. is whether this Salt found has the Alkali therein it or is added afterwards or is found with other Alk as in Vitreous Nitrates. Alk. added afterwards.

The D. has some Specimen of Nitre found in Wales out of a Vault, but it was in California Laboratory, but in other respects the Neg. Alk is never found in Neg. or Union Subs.

Thus little old Manufact. of this Salt Lect. only made in large quan.

First Necessary to make the Dist. Acid then add the Neg. Alk.

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The Vitriolic Acid is very always got in the last stage of Putrefaction of Bodies, as being a constituent part of Animal & Vegetable Substances. From the Pitted Bladder a Vol Alkaline Salt is in fine for the Vitriolic Acid & Phlogiston. Whether the Acid is only here preservative against putrefaction & thus gives the Acid is Phlogiston as its directions good Practice seem to prove the Case not therefore it to look upon the Add Sea Salts to it seem to make and Compound which take place & the Land wind & Phlogiston the Coast is to add such a Sub: as will make the Vitriolic Acid force it to fly off yet not hinder Putrefaction as Calcined Earth.

Animal & Vegetable Substances yield the got in great Quantity Calcined Earth added to Substances of many kind promotes Putrefaction the Vitriolic Acid seems in Part in Putrefaction rather hinders Putrefaction but the Salenitic promotes it. I have often noticed in Europe for this purpose to add Lucky Lime, which soon reduces to Ashes but not further earth. the Calcined Earth should be got again Lime & be powdered.

Alkaline require a degree of heat some tho a less than others. Heat here necessary and this Prac: generally made in summer. Should also be exposed to Air in order to promote Putrefaction & not in a close place. The Pots should be in heaps 20 or 3 feet high. The Parts to prevent the Acid fly off therefore the Pots is to be moderate therefore in Do it on the Shade least the Sun act upon it which has the greatest influence on Bleach Mills as Putrefaction should be made a gentle a with North Wall & Addition

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The Dried Mr. wch is made to be concentrate
by Heat & recent its drid, & Vol Alk & Common
Salt is of proportions recent some dise this have been
called of matrice of Wine, hence does seeing ad
lost in the Ind for wch Salt cont. Retard the [illegible]
we in Europe are obliged to add it.

To to Tenite of Lead in some of its Solds to
prevent its effs off of Tale Earth used in Butter
of Lead. Tale Earth would be either wise drop to
off Matrices if it could be got in suff Quan:
Must be defended from Recent, also last of alth be was ap
A have been recom. to add sea Salt, bad Matrices
but whether this have any advan. is uncertain
yet there is Figures of Dele Effective Alth as
The Mr being Impregn. wth Vol Selinites of
Vol Amm: then y Salts are take Matrices from
Matrices by Water. after y: without purefy:
thro in a Pot wch y quant. wou determ:
by Summes of y Vol Alth: while y Tale Earth is
force is. hunted sichers q offo Alth is coap:
add y Cow'd Alth like y Vol Alth is known off

The Vol Alth: perhaps nought be saved by Dist
in other Still (Copp. is not do).

Now we have it joined wth Mucilage wch tend
Ferm:n Much Lime sh be added wch destroy
y Mucilage then distill & Evaporate it in y Sun
if Climate is warm, if not Gold by fire y former
makes y largest fresh Ferm:ts of other Smelly

The

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No 35 The Chrystals of Nitre often consist of 6 sides which
we can't separate by Calcination and Nitre is dissolved
but hard upon Fire as we do Sugar of Lead or
attract of Oil.

We expose a Matrix again to the Red more
but matter proceed to be fixed yet more Nitre

Nitre is very pretty pure yet contains Crystals
with many separated by dissolut of Salts as often are to be
found some or other.

The way to judge of Nitre has any Sea Salt
add a drop or two of solut of Lead in D. Nitre
and if pure Nitre appears a Cloud appears there is Sea Salt
but if no Cloud appears in Dissolution Common Water is free of Salt
The Nitre may be disposed in Dissolution w.r but Salt
may do. The Well Water with which Nitre
of Mercurie with Silver falls to Bottom in a
Corrosive.

The Nitre purifie is a need Process
if we would but choose of large Crystals as Procure
in Dissolution advantage as making Nitre Physic is
but we have Pin small Crystals are hollow of Water in
middle, hence deceptive.
The Crystals of Nitre are 6 sided Prisms in Sea water
only 2 of Water taken 6 times dissolved of W.r to
dissolve it when cold exhaust 60 degs of Fahrenheit: but
W.r freezing will be required in Summer to Warm Water
dissolve it at 9.

Not deliquescent except in
Lunary melts in Fire as also many Vitrifactor but
Dissolve Nitre melts cursorily Salt Salts but Phlegm hap
to be added Deflagration is quickly is seldom detected
of two considerable Layers of Phlegm as in Gunpowder
[illegible] 18 [illegible] Crystals

these are beat together in a Mill by steam Water or Horse
Power to prepare Display, after sifted from Sieves according
to the Size of Grain then dryed in the fire.

used in Medicine on account of its agreeable Coolness
in itself alone it is preferable to other Salts

Easily decomposed by Deflagration or Red Attraction as
the Acid of Red Acid: after Deflagration Alkali may be
known whether this Salt is Vegetable Alkali by
dissolving it in W. & measuring it by its Saturation or Respectively
weight of it.

Cubic Nitre never Naturally on the Earth Red
it consists of Acid & Vegetable Alkali: is never made by
Art in Every Large Quantity but might be made if they
looked chiefly instead of Potash which they avoid.

So made by pouring Water Acid on Sea Salt
which decomposes it Nitre: which is lost from off in
Distillation. The Chrys differs from the other Nitre
in being Cubical not perfectly so but other Rhom-
boidal. is difficult to get the Chrys perfect aspect in
Winter. the Chrys: use of this form [I]

Easily Deflagrates the Chrys and burns more
easily than Common Nitre. The taste is Cool as Nitre
as Nearly Deflagrates perhaps to make a stronger
Gun Powder than other. Nitre, but this is not so easily
melted that it Deflagrates easier. & the S. force of Water.
Never used in Med: contain 39 grains in a
Chrysots does not melt so easily in fire as Nitre
soluble in about 6 or perhaps 5 times its Weight of Water
but little known are never made but by Chance

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Chap. 4 32 Ten { Common Sea Salt
Nitr. Digestive Salt
Tart. Regenerat.
Polychr. of Potash

Neutral Salts are { Fixt
Ammoniacal

Fixt Salts { Deliquescent
Deflagrate
are not Soluble in Alcohol
Are Soluble in Alcohol.

This Table may be introduced any where as well as here

We come now to ye Neutral Salts made wth ye Mineral Acid, but whilst we depart from our General Rule wch shall n't begin wth those made wth ye fixed Alkali.

Com. Sea Salt is ye most common of all the Salts found common in Germany in Mines, is call'd also Rock Salt, those Crys. cubical & very hard like some of ye Gems call'd Sal Gem: is tinged wth diff. metals as Copper, &c & specimens of ye sd sort when

This Rock Salt is found out of only three sort when P. in large Chs found in ye Cold Earth joined wth Metaline Calces Earth &c wch requires particular

Thro' ye Rocks of Salt Springs very common as also in Mines, wch dep. ye veins of ye Earth empties this likewise ye Springs or another way, as a Sea Salt is scattered all over ye Earth, this wch in all Waters almost, of a Sn of Silver in ye Lead is

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add to Cm. W.r. if the Acid unites w.th Silver Vitriol
in a precipitate in Stol Chymistry is a long stl cathartic
fore lyd W.r being Evap.d by a gentle fire on a broad surface
Coun.: is made from Sea W.r by Evapor.n by fire.

A great D.y is in y.e Sea how it got there is
disputed whether there ab origine or Washd from
Rocks of Salt is probable that y.e Sal.t water with
Salt first as from Ores Anals if Saltness of
Sea W.r is much encreased, a 20 part without this

Sea W.r also contains two Earthy Salts, as
Vitriol is Selenit, & Magnesia is Salt, y.e Sea
S.t for use is to be sep from these. Selenites
is found in all Springs almost, but in small quantity

It must be clear of y.d G.ss Salt for our use
and must be done cheap: also if a slow fire and
you boil em strongly all y.e Salts will be decomp
and y.e Mur. acid fly: if M.r Magnesia or else the Salt
chang into Magnesia. Heat to y.e Rock Salt
y.e Bay Salt is purest of y.e G.ss Salt & Selenites.

To get it clear of y.d G.ss Salt when we evaporate we
must not Evap.te all y.e W.r Sea W.r in Lobsy contains
ab.t 3/4 of Sea Salt & 1/4 of G.ss Salt if a little
Selenites is to be dried off y.e G.ss Salt by oth.r W.r
Salts, & should get in large Cryst.s as allways
excited Sea other Salts,

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The marks of its purity are 1st the size of the crystals of the large, white consisting of plates, or hollow parallelopipeds: being of only 5th of the water excludes of other Salts.

The 2d mark is its dissolves in Water into a clear solution with any dregs or impurity this is a sign of purity, from Selenites which is not soluble in 99 times its weight of water

3 The taste which is pungent but not bitter as Glauber's salt & Epsom Magnesia & Salt attracts moisture from the air & becomes soft & moist, hence another mark of its remaining dry & white is a sign of purity & vice versa.

5: Another is drop a small qty of the Solution of the salt with oil of Vitriol Acid and magnesia salt stronger than Magnesia which is precipitated as soon as the Solution be absolutely clear of any other salt for use as an antidote: which by Glauber promotes the operation of the salt won't answer unless used in great quantity

little used otherwise in Medicine, & not for purposes

It needs purifying only for Table. Yet Culinary purposes may be purified by Solution & Evaporation in a very slow fire, is soluble in 4 parts of cold water therefore it forgot: as soon as a little of it is swept

The Solution frees it from the Selenites, & gives pound Glauber Salt by Dutch method it thus treated at Salt upon Salt, only thus dissolves it in Sea Water to obtain additional quantity & this they use in salting the provisions

The Crystals are hollow Cubes. yet are very hard especially if they contain Cubes. Each Crystal is made by an accession of small Cubes. It also sometimes forms abscissus into Parallelopipeds. wch are two Cubes join'd thus ⊟. The Rule of this Salt being soluble in as q.t G. of Cold as of Hot Wr. is not absolutely true. for if it is found in dissolv'd in Water it w.th Hot upon cooling cth Bi wile fall to d Bottom. In Warm Dry Weather loses any superfs moist but not any of that in their Chrystals, and wch profs moist. Wr. attracts Water.

In Bi of dCn Salt is contd 9 oz 22 of Water that is actually in a dry form in Crystal. Yet it never loses but when exposed to a G. H. of 90 wch a crackling noise call'd by Chemists Decrepitation. By this they have endeavd to dis[illegible] this Salt but it is not only Sult in Decoct: as Pitt Sulphur dal Digestio,

Is not very easily melted therefore when united w.th Nitre and Nitre may be melted & poured off the and other at Bottom of d Crucible

May be decomp'd by Calcyn.n & the Alk.n Deflows most of d metals.

Does not easily affect Earths in melting wch an into Glass

All d Salts preserve Animal & Vegs Subs: from Putrefact this Salt is not used, but they should be part as d Earthy Salts promote it d Pringle made these Observations

NC Salts rather coagulate fluids, but is in little degree. they prevent the globules of the dissolving in the Serum & also if added to a soln. of blood separate the Clear from the Water.

Sal Dig Sylv not found anywhere Native as the Veg Alk never found Native, is met with in them Cher. not often enough to prevent our making Sylv Alk as in mak. of Vol Alk. from Sal Amon. its effects not differ from other Salts especially of Tart. is fused by fill. & Evapor. & Crystal. which is in Cubic Crystals and this is sep. from any other Sal. by Quantity of Alk & Vol. of any Glycosphorus Sup. differs from Scaliatin & Sol in greater quantity of Warm Water then cold mother resembling Common Salt. Crys: are flatish Cubes, taste like the other, & may be used for the same purposes not deliquescent as Sal Enlarge Imp. dose all the Medical uses pow. & does: Does not dify neither in other Bi cont. 37 grains of Water.

Thrown into the fire before it red. which it did some appear. as Comm. Salt. so also does Vitr Amon.

after decr. remains dry tasting greater heat than Com. Salt to make it fused

Dissolves like other most of the Metals

Never tried in Earths.

Has been of late recommended in Fevers, as Alkal. Salts have shed diff. Virt. accord. to com. but really differ little, Eacnis name of 66 diff. is supposed diff. Virtues & Medicines

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We shall leave ye other Salts made wth ye Fixe Acid & Ammoniacal

Now some lookt Salts made wth ye Vegetable Acid and ye those wth ye Fixe Vegetable Alkali contrary to what we did on ye Mineral Acid.

Last Regimen: or Tartar from its being stopen. Its diuretic & Deputative ~~frame~~ which was call'd Sal Diuret. call'd Key Tartar from Vinegar said to be when to tartar & thus very regenerated made

Power & Nature: The Fixed Alk has ye Affn to ye Acids than other Acids hence seldom ye in Operation therefore make they comb & Acid &c.

The Acid comb Gelly & Gummy Bs. after its Formn: wherefore ye Distill'd have been used wth Gelle matter & Alk. Oiley therefore is calcind wth mucilaginous Gelly Particle insoluble in Water. this shall be shewn as ye fol. Method of preparing

The best way is made wth Alk & Potash common Vinegar by wh we loose none of ye Acid. as in Dist. much is left and Retort, save extra ye expence of Distn.

To purify it is very difficult but pour 12 Bs of Vegetable Acid upon 8 Pounds of Gelly by wh you have a pure Vegetable Acid wth ye fixed Alk again pure & you have by Dist. to unpalatable Pr. a pure Salt. The Acid is to be pur'd by ye Acid & Alk & not v. v. as ye Acid is red. of ye Alk off by heat.

Pour ye Acid upon ye Alk then reduce to a Pellicle & may be in ye Water Bath. ye Salt dry & upon ye Fire immediately. This like other Vegetable Salts may be had in a Crystalline form in long Spicula but we can't depend for ye Superfluous Water. Extremely soluble & made use of for wh it easily attracts

Vol. 4 29 on y Mercial Powers of y
Vegetable & other Minerals
The Caustic Vol Alkali is frequently used

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If differs from ye other Sts made wth ye Vitriolic Acid in ye Soluble in Alcohol. It hence may be purify'd from other salts by this means. It easily fusible in a fire mell wth less than ye other Sts. Salts ye Allm of ye Acid Vitriolic. Its very little is easily decomp'd by this menstruum. Lapis Ainsi not ye formed no etching wth ye Sp. Inf. Sol into Alcohol, or

When us'd in Medicine to determine if Dose should be perfectly dry. These only Salts wch ye Cm Acid Vitriolic. The Polych offr. hell is rather made of Tartar and not of the Vegt Acid. Differs little from Part Vegetal. The Olea Tart & Polych offroch shall rather be neat: not ye Natural but be combine d the Vitriolic

The Acid is in a Solid form, & not easily volat in Wr in ye Cold, is therefore dissolved in Warm Water & then if we wd make it to offrobor Salut Tar we use ye Fixed Vegt or Fixed Alk. an Effervescence is occas'd as wth other Acids

And Solut Tartar shd be nice mixt Salt. no ye Tart is not Volat & ye Salt is easily Crystal. Therefore differ Vegt from Alkali also. The Sp. Salt is not Soluble in Water, ye Tartar & Malic is both full & Sp. much need a a Purgative Patch. is Sp. to Prynes hot Bx. Polychroffroch Ale need ye same way only ye Prosilar ed molecd of ye Vegt Fixed Alkali, ye point of Satur need not be so nice about here a it will Crystallize.

The meth of Dissolving working is from one another as in ye Plates. They may be distinguished from metal salts by add ye Fixed Alk. fixe

a. of Hot than of Cold Water of other capacity in both

Those that Decrepate as V. Tart: Sal Sal Digest
distinguish'd from one another by ye solubile in Diff
Q. 11 Yet Tart least may thus be distinguished being
soluble only in 20 times its weight, & Sal Sal Digest
may be distinguish'd by ye Sal Dig being soluble in 4 times its quan
Those that Deflagrate are Cr & Cubic Nitre
may be dist. by their Crystals from one another

Those that don't Decrep. or Deflagrate are Sal Glau
Lin Polych & Hoch, & are not sol in Alcohol
or are soluble but to Alum may be dist by their Crystals
from one another —

We come now to ye other Salts made in ye Muriatic
Acid, ye Ammoniacal kind —

Sect: ye 33: On ye Ammoniacal Salts.

We have gone thro' ye Neut Salts made in ye Com Acids
& fixed Alkali we come now to ye Ammon
In treat of ye Ammon Salts which not being so th those made in
ye Vitrolic Acid & other are little known
The Ammoniacal consis: of ye Acids & Volat Alk are 40
Vitrolic Amm: Nitre Amm Com Ammon & Sp Mindert
These are to be distin formulae of Salts by means of fixed
fixed Alk or ye line w detach ye Alk, as is usually by some
These are not fixed in the fire as those of ye fixed Alk
is same more h to make em Volat & to decompose
em there is only fixed Amm of ye Sal Vitriolic form
is in ye respect unlike those of ye fixed Alk

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(a) As the Vegetable Soot contains a greater q^y of fixd Vol Alk^l than Q^r, & the Expence of add^g Mr. Acid will be compensated by q^y & q^y of Salts obtained

(b) After we have got fixd Vol alk: it must have Mr. Acid added to it, & then may be fining'd by a gentleth^n wch renders it Oily, insoluble in Water

Common Ammon: ac. bro. from Egypt: is not p. Salio but near Volcanos & Burning Mines

So mu. cas. Vol Alk: ness. in ye fire by ye action upon ye Bitumen, yo. Vegets be ye fuel whether there be Acid or Alk. yrself & Acid & Alk. as seen when dis. It is not so in Vegets but in St. quan. in Ammon. tho' there do eat acid as Alk. yet is Pliny correct vol. ye acid & Alk. yet generated is most on the thin fluidos as Serum not so much in ye Congeable humors or the globules

It also prod: in our Stoves, wch fuels differing ye they afford no Animal is ye best, in but ye Fossile fuel there is supt acid to saturate ye Alk: as in Coals & there is not much acid generated, as makes ye Soot afford so much Ammon: acid Vegets does tho' thus afford more of ye Vol Alkali

It seperd from Soot alone for use is never done from Chimnies tho' it might wch indeed ~~perhaps~~ thus sublime Soot in large Vessels, for Egypt they do from Bro Dangs. In Edinburgh fuel never worth the use. ye Fossile Soot wch answers well tho' somewhat greatly.

In meth. it form Vegetable Mur. acid and lie. added. (a) may be seen from ye Chimnies by advantage ye Smoke as fm Urine, especially at London

The best way is to evapor. fresh Urine till it keeps to make ye Vol: Alk. turn ye Pricip. put into a Retort Mercury di Sublim. sublimed Vol. Alk. over (b) may be purified by ye rend. ye Oil insoluble in Water

The Salt got by Sub. is a clear Crystal Mass wch a little plus like cold Tophus seems to be dr into ye Vessel

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In this way we have it pure; may make it also
in Chrystals by dissolving Rosin in Water, the Chrystals
are parallel seem to be assemblies of spicula this shd is
of mixed solid form of Chrystals & are nine double
pyramids which add to [illegible] which however
are not easily to be distinguished from short lines of
shd be found in very large

These Chrystals seem to contain Diaphor in Bi
but may be hed drn for ofd dr:

Spirit tartar easily volatilized just before it grows
red hot, but soon condenses again.

The Attr below of Red Arsn is too s to permit it to
be decomp by Calcin and is volatile before that time

Is easily soluble in Water if hot dissolves in
equal qtys but in cold Wr requires 4 to one

Attracts moisture in the moist, but rev in Dry
Air, thus low s to dry & moist but only Wr in the Chrys
wh requires great hd to make it solve & [illegible]

Does not dissolve by the other mineral or dry
salts not bear heat enough to be dissolved as Gum is
of all the Metals, the Red Salts are addi solve
Metals so also the Salts do build Amm: of greater
qty: wh Solut: have a pur [illegible] like Copper.

The Platina and [illegible] Metals of Gold: for this purp
These Metalline Salts made of Amm: salts are all
volatile, the Metals are not. Some Solut: of them have
been used in Med: as the Vener bel Stor Mort

Tincture very useful in Medne as they have no
astringency when dissolved in Water Greedy Alk:
in Tabes & Dysent: & Decoction arrestibility, used as the
bark in Inter: also in Rheuma.

(a) as suppose a lb. constant. common common
metal is any of y metals combined in Vol. Acid
then a double Elect. att. will take place
bra. new point of metal Vol. violent of Vol. Alk.

and S^t is only to be decomposed and the Alk^s & this
was called Acid or Alk^s may be obtained pure
if one by add^g an Acid wch has str^g affin^y to the Alk^s
or an Alk^s that has str^g affin^y wth the Marine Acid.

Spirit decomposed wth the Vitriolic Acid we have

Vitriolic Ammoniac call^d also Secret
Amm^ac: by Glauber from its partic^l properties
is thought Native tho this probable it may in Sp^r Water
by, & Amm^c Water met^s wth those that have metals
by wch a double Sl Alk^s takes place (a)

Can make it by decomp^g St Acid so much by
is req^d to decompose nearly the Amm & boil very
this pure is to add the Alk^s to the Acid. & to judge of the
dat^n may be tried wth Syr of Violets wch tho bett^r
shewn more Alk: and flux off in Evap^n. hence
reason why we add the Alk^s that long Acid & not vice versa
after Evap^n ad^s lots Crystals wch are often oblong
plates form

Dr Desaguliers wth Mr Hauksbee, Sir, com^d
Dii of W^r they dissolve Silver (in Amm^ac) Metals, either
by reduc^g the metals in Calcs, or in powder & solid^g of
dat^n or of Metals & Sp^rs into Silver —

After Decrip^n carefully melts lib^s 30 of Alkali
in Sp^r Nitrum in Dist^n & after Alk^s all comes over & not
add. contrary to other Alk^s & this way the Alk^s & Acid
may be obt^d. Alk^s into Concr^e form & Acid into
longer^d crystals These Salts have no smell, & Alk^s
wch also may known to be in con by Sat^n & Alk^s
off the Salt with bottom remains Cry Acid, tho this Sp^r
not exact as it Salt is made Volatile by heat

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The Comb.n of Vol Alkali with Nit. Acid is call'd
Nitr. Ammon. & never p.d native & Nit. Acid
only prod.d by Putref.ve fermn.n as also is Alk.i

It differs considerably from other Ammon. salts
by deflagrating w.th or without Charcoal. & Vol
Alkali was cried was made of Nit. Acid or Aqua fortis
& Sp.r a proof that is made thus that this salt
deflagrates after the Nit. Acid flies off & alk.

Dissolved Metals & same way as other
Ammon.c Salts.

Can.t be got by Subl.n as it deflagrates in a
little heat never be got in Crystals & takes up
a considerable Q.y of Water.

It differs from other Ammon.a also in its solubility
like Tartrecinian Alcohol. & Fixed Ammon.a are not soluble

Never be decomposed either by Distill.n by itself Dig.n
volatile Alk. is regenerated, fixed Nit. Acid unchanged
w.th & Sp.r & mutat. volat Alk. is very inexplicable

The Phos. Acid & Vol Alk. combined make
Sal Mirabilis differs from this in its volatility
never found Native or in Earth surface or B.d fixed Earth
nor Ammon.a Sub: as Acid is only produced
in Animal Fermn.n never got in Spheraldrons

Difficult to be got dry as if heated it flies off if Dis.d
& full combustible & Water, neither can it accurately
get it by a Simp. Alk. as it Acid & Alk. all such other
mutually correct wearily. We therefore make use of a
Double Alk. get it dry & this by mix Phos. Sod.
w.th Volatil Ammoniac

(a) as it will make a salt wch is stronger & may be easily given in add.g vow to produce some Effect but in ye Comm.ll sp. mundi in ℞ new not above ℥i of ye Salt of Dor. therefore the success.n must be large

y Comb^n is Ohio 20/12.

Vol Acid & Fixed Alk

16 Alk a 63 16 — 16

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Vol Alk Vol Acid

The 2 a bo mix Cold remove h^n will be sh^d but by Heat if Alk^n being destroyd, so if Vol Acid & Vol Alk have little Alk^n is not Separ^d, but if they fast require more, if Alk^n comes over at 1st Separate but in Coming over Combine.

In mak^g of Salt Mind if Dist Vinegar is used with we have a Salt Coming in large q^ty of W^r m^ch Dose can be little. The Concent^d Acid would therefore be better (a) The pom^b of Saturn should be attended to in mak^g this Salt as this so Volatile that it can't separate either of its principles when reduced. No Effervescence takes place on first beginning to mix ye Acid & Alk.

The Properties of Lead & its Alcohol &c not much known, tho' I believe it dissolves

It may be decomposed by an Alk^n either simple fixed or add Salt Earth Alk. or a strong Acid & by a Comb^d Alk^n by add^g Vitriolated Tartar

We have now considered Saline Substances both Acid Alk & their Comb^ns shall next proceed to Inflammables. To morrow their Properties are don't differ much from one another, & shall also look over Dispensatory.

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a) [illegible] introducing [illegible]
a living or dead Body.

Lect: 34 On the Propert of the Neutral Salts

In this Lecture we shall treat of all the Neutral Salts under one head, tho' they differ much in their medicinal effects, and that of some Salts that have these properties, indeed different waies, & that the Salt Prunel differs from the other effects of that Polychrest tho' we find they are all in reality a Diuretick Cooler. These if given in large doses will vomit, often in smaller they will purge.

We examine them as applied to the Medicine of Men's Bodies, first as applied to the simple solids or simple fluids of bodies independent of the Powers and Tempers of these. Their Present Effects from Fermentation & Putrefaction they all tend to nearly and same degree. (a)

There is a considerable quantity of the Neutral Salts (viz Ammoniac &c) found in the Serum of the Blood. The Blood consists of Red Globules & Serum, the former not soluble in the latter but only mixed mechanically. Hence this owing to these Salts that render them insoluble, as they are easily dissolved in Water it has not a tendency. Hence their use seems to be to accelerate the Coagulation of the Blood.

Upon the Solids they produce a degree of Hardening every in the Animal Body.

With regard to their Nervous Power, or on the living Body they have different effects acting as a Stimulus to the [illegible] Power in a manner differing from Alkalies to destroy & not cure. The [illegible] their [illegible] from the action of the Alkalies, they [illegible] Nervous Power. By their action on the Nervous Power they are to be reckoned in Lyes, and Warm [illegible]

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No 37 without encreasing any secretion.

The skin is a part that is neither delicate nor sensible enough to be affected by the stimulus or antiphlogistic qualities of such substances, if the inflamed or obstructed have been therefore applied extremely without any good grounds or sufficiently.

The Mineral baths on account of a small degree of warmth and is highly contributes to its effects, and hence the bathing may even more better than in common baths.

They have been used occasionally in fomentations, particular to resolve tumors, obstructions, if obstruct. do exist, especially of scrofulous nature, but improperly, as they can have no effect in resolving, and if they could come to them would rather increase the obstruct. by occasioning a greater expansion thereby. If applied to a tumor thus must extend somewhat in the dilated thro' the tumor into the blood vessels in order to come to the obstruction, which can never do. There seems only to be one way in which they can resolve them and that only by means of the friction used in rubbing in, it be skin because heat and also thus the effect of friction to some degree have done by the friction alone, as also in the constitution thus an irritation made in the neighbourhood of another will relieve of first.

They have been used to wash foul ulcers and scrofulous sores, but are of very little more use than common water perhaps indeed they have some effect here by their astringency. The Howler drinking waters at the same time we shall consider their whence come to their application and of remedies —

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in Lumbago's & Rheumatisms its not good, its effects cannot be ascertain'd tho the good Effects wch it has occasion'd no cause were probably owing to the friction only. In these Cases if Cat Castoreum alone is proved useful, yet as Polychrest

Mouth

when applied to the Mouth that act as Ptyalismic drugs do, in large quantities to the Mouth, hence allow them to be good in Convulsive Fevers, the same may further purposes yet preferable to others, on account of their Taste, for such as are disagreeable will cause instead of allay their Cravings, but if they be agreeable & Comfort.

Nitre has been given in Inflam^n, the Cornils tunica, but its stimulus is too great for such purposes and will often increase instead of lessening the Inflam^n.

Stom^ch

As their action is principally in account of their stimulus when applied to the Stomach they act there by means of their stimulus on Nervous Order. now as we have said stimuli are of different sorts some act on the part only to wch they are applied, others act not only upon that part, but also stimulate the Nervous Power at the same time. Others while they stimulate the part are sedative, of the Nervous Power. Some by affect by their stimulus the constitution. Others weaken it as some Freezes. Others stimulate the Stomach so as to produce a Vomit.

The Action of Emetics is three fold.

1st As they merely excite the Stomach to throw off its contents by an inversion of its Peristaltic Motion & such a irritant on as forces its contents upwards

2dly Increase of the Motion of its Heart so as to throw the Blood more powerfully thro the Vessels.

3dly perhaps last means of the second increase of Action of the Nervous Power over the whole System ~~tence~~ of the

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in the beginning of Fevers to make ye Nerv Power act powerfully over ye whole system raise its condency deficient & remedies hence the said patients

In Fevers the Blood is forced in great plenty to ye Heart & large Blood Vessels to filling them thus by the being

Emetics on ye Stomach excite a Nausea & Inclination to Vomit, but sometimes this natural effort is not sufficient

Clysters therefore Emetics are necessary to promote it. Blistering Emetics do not act alike some only touching the Stomach

Emetics merely proceed upto contents, which others, don't so much do this, as they make ye Nerv Power act on ye extremities

so much difference is there between Antimony & warm Water. It is for these two ends therefore that Emetics are given to discharge ye contents of ye Stomach for ye purpose

Warm Water, Chamomile Tea & Ipecacuanha are the

To make ye Nerv Power act for ye use give Carbonates or Neutral Salts to take off ye shewing Scurvy & Scorbutic

and remove ye Febrile Paroxysm. The dose of the Salts for this purpose are those made of the juice of Lemons & ye Fixed Veg Alkali & the Juice of Lemons

prevents ye Stomach throwing it up. But these should be given when they are cold. Not is going off. And that they should have

and effects must be seen in larger Doses than they commonly are viz 3ii or iv at a Dose. Hence in in a continued Fever or

Intermittent it is irregular, such a rapid Calomel Purge

Appearance will be found that the Bowels may be in a fit state

Fever should be combined with some Medicine that

has an antispasmodic quality to hinder it from vomiting

Medicine taken shortly ye Fit is easily put to a stand

Nature than in ye cure of ye Disease

there is

There is one thing to be observed in ye giving of Emetics in a Fever, and that is the Vomits should be assisted as much as possible; as soon therefore as the Patient can bear his Stomach without vomiting, give a little Diacodium, or some Anodyne liquid, wch if not a copious Diaphoresis is brought on and ye Crisis or Intermission will be obtain'd.

Some Neutral Salts differ from these in exciting more of their effect on the Intestines than on ye Stomach, as Sal Glaub. Cathart. [illegible] Sea Salt, &c. If these are given in considerable quantities & properly diluted they don't act upon ye Stomach, but they stimulate ye Intestinal Glands, and by this means increase ye discharge by Stool and [illegible] than supposed by their getting into ye Blood & cutting down its Globules & thinning it.

Purgatives are of three different kinds.

Some at ye same time that they stimulate or purge strengthen ye Constitution, of this sort is Aloes, Colocynth, Scammony.

Others Purge and at ye same time weaken as the Neutral Salts, the first are call'd Phlogistic the latter Antiphlogistic. There is a third sort wch purge & yet don't either weaken or strengthen ye Habit, as Jallap for instance wch seems to increase the Secretion rather more than ye other sorts.

Hence it points out wch of these Purgatives are proper in particular Cases. As in Hysteric Cases &c. if we want to open ye Belly Aloes &c. wch strengthen are used, but these would be very improper in ye beginning of an Inflammatory Fever. The Neutral Salts are very proper in these Cases, yet they are improper in Hysterical Cases, wch they weaken & increase ye Disease.

So in Dropsies we give ye Neutral [illegible] Purges or such as neither weaken nor strengthen, wch Jallap Buckthorn &c —

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due to their effects upon ye Blood that can have
been the consequence of their purgative qualities, wch they
exert so powerfully, and of giving a more
portable diuretick by no rule. Their principal use
should have been in Scurvy, but we cannot get a suffict
quantity of them into ye Blood to prevent putrefaction.
They never can dissolve ye Blood but only keep the
Acid Particles from being divided into.

On ye Islands have very little can enter the Blood & but
little can come to the Kidneys yet if plenty of Water is
drunk it can have may a little increased into the Kidneys
wch may stimulate & increase the Secretions & they
principally do in the Dropsies prov diuretick.

Whether Vitriol has any heating power more than any
other of ye Salts we cannot determine.

It happens generally to be fashionable to drink
one particular Medicine more than another, as Sea Water
was much drunk for all Disorders, & many that were cured
by it would probably have done well without it —
This is now out of date & is fashionable to drink Scotch
for all Disorders wch without any hesitation or from
know what it contains.

In 3 lb of Scotch Water there is 3ii of Glauber Salts 3iii of
Magnesia Glauber Salts & scarcely 3ss of Selenite
the rest is Common Water. The Selenites from Lime and
3ss of Salts Perhaps must therefore either be owing to the
Glauber or Magnesian Salts.

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I conjecture therefore that as the Scrophula is a disease arising to a weakness, relaxation or other defect in the parts that bespeaks the strengthening medicines are required.

The last Diuretic was been principally used as a Diuretic in preference to other Salts. As it contains a little Burnt Oil it Diuretic qualities may be owing to this, or perhaps this very little more Diuretic than the other Salts. as the others have not been tried on these purposes wth perhaps they might answer as well.

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538 Lect: of 35 on the Operat.ns for obtaining Salts in the Dispensatory

As we have gone thro' the Natural & Chem.l Hist. of Saline Bodies well Acid & Alk. & their Comp.ds we shall look over their Operations in the Dispend.ry before we proceed to any New Chem.ry.

Salts & Saline

Nitr. Purificatio. this is a needless Op.n the Crystals after this Purific.n being hollow with Water therefore the Dose is not so well determined, unless we shd dry them after Chrys.n by forcing off the Water fire

Sal Amm. Purif. is Sal Amm. impregnated above the Chrys.s too and worse to keep from being liquefied by moister time & Clear Sal Amm. in Cakes is as good as this Preparation & is sufficiently pure if we chuse clear

Sal Absinth &c. & Sal Rosh of Tartar are as any other & ought to be kept. It is rather purer. being over blown from Vegetable Alk.

Acetum Tartari this is not so bad a process only this that it gets a quantity of Vol. Acid hence the Tartar & if a very mild Alk is wanted this will do not as Acid in Water, but Pot. Ash is Wise as good only not so mild.

Part Solubile order to Evap. or Crystl. in this case the Dose will differ according as it Crystl. wants much Water otherwise the Process is very good

Mr Rutherfords Med: on the
N. Salter by Inuis Stern hereed same effects as above
dit in.

Lix. Saponar tho' ye wc in general of Alk.
more Caustick, but this will do for Pr. Ess. It is
ordered yt its Spec. Grav. is 105 to dilute it, but
this is prov'd wch for dis. Oils and Alk becomes
mild by ye Addition of Evapor. yt measured
a Pint ought to weigh Ixviij ~~ounces~~ Troy

Caust Com. Fixt Mutius of Stronger wc a Pc.
ought also are to be preferd not given be for Pauper
of Mutius shd be set aside of Tomatefied Cortex
Stile stronger. ~~Oyl~~ Evapor'd to be evap to ye half
then as much Lime added wc will make it Polyc
but if Evap: to an 8th part. then made solid w
Lime. will be much stronger & need not be afterwards
melted as of Dispd order, wc in melting it becomes milder

The Distill a simple operation & needs no explanation
Good shewn of nitric when on ye Acid
Part Regenerat wd be better if made by ye Comm.
Vinegar than by Distilled & may be hurtful wc new
Spt Vitr Fort. & Sensor Oleothar, this is done
formerly
by decorbon & All by Ferment. & wch become
over & are ordered to be mixed & purified by putting
into a Retort. The name Spt Improper shd be
confined to Alcohol. Acid nitri Concent & Dilut
Blue better to should prescribe of Specific Grav
of ye Acid to prevent mistakes and varies wch Spgr
of Sp: Grav should be tld as 18 to 16 & then mistake
obviated

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Spt Nitri a Distillatn by cum Ol Vitr. ye Spt of Vitriolic Acid is too little ℞ 10 Spts be used for lb of Nitre, & this wd be a pure fm of Nitr Acid.

Acid Nitrosum Coveatlm is to be a better name than that of Spt Nitri

Spt Sal Marin Glaub of same sort of process

In this there is too much of ye Concn Vitr Acid especially as ye Sea Salt is not order'd to be dryed. wch it should be; & ℞ of Vitr Acid should be order'd to ℞ of dryd Salt

Aq Fort should be laid aside as we can not be certain of its strength &c various degrees & ye Acid differs not from ye Nitr Concn Acid.

Aq Fort Comp is an Aq Regia, of Nit Acid & Muriatic Acid in forced off in a Retort but ye Muriatic Acid added to ye Nit in a better method of mixing it & should not have ye Rubric Nitrum ye process, as we have it here

Sal Vitriolatus gol as well in ye Distn as ye Rubric as by the process prescribed.

Nitrum Vitriol. is ye same as ye Sal Vitriolatus

more Acid wd be here - wd is an uncertain way as add an Acid to a Salt afterwards is more certain

Sal Alth Glaub it should be calcin'd before Charcoal and then have it clear of ye Acid.

Spi Sal Mar Cas; to ye Digest Salt of Alkaline - by add ye Alth to ye Acid & not vice versa we shall have too much Alth besides yo N Salt should be evap'd to dryness as ye Alth is reduced to a Magnesia

558.

Oil Sulph p camphor is very all y Vitr Acid so now made but only in large Works. it Acid here is much diluted. w. is is y reason that some have thought there was a difference betwn this & Oil of Vitr. of y Shops

Spr Sal Vol Succ is d Sepn of y Acid from Amber is ord

Spr Sal & Oil C. C. is y preparn of a Vol Alk & com a most agreeable Impregn Oil fluice very good Antispasmodic. Vol Alk may more elegantly be comb wth Sp Oils as in Eau de Luce

Spr Sal & Oil Cuticularis is from Soot in y same manner as above from Hartshorn or other Anim Subs

Spr Sal Vol Ammonia a mild Vol Alk. d by distill Alk. wise have ment before and Vol Alk exp Heat w is supp navalways equal wc and have an equally strong Solvt Cut abs Strength is various. Chemists

Spr Sal Anim Dale. Give don't use y C. Alk it won't dissolve in Alcohol this is therefore only a Solvt of y Vol Alk in Water w a little Spr of Wine Quicklime should be used instead of C Alk if we want y Vol Alk dissolved in Alcohol.

Tinct Spr Vol Foetid should be made also w Spr C Alk as also y Spr Sal Vol Aromatic as it will unite better w y Oils.

Gal Sulph is a very dilute Vitriolic Acid only

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The Aloetic Alk is a very odd Prescrip among so many elegant ones. Part of the Fixed Alk is combined with the Muriatic Acid in the Plenym. and we whale hope ab 3 ℥ of fixed Alk. Pro of Sal Digestivus & 2 or 3 drams of Pot Alk. of fixed Alk. also prevents purgings a quite quantity of Aloes for both acts as a purgative is only 5 grains of Alk. can be given at a time why Castro & Myrrh is prescribed is uncertain.

Tinct Mart in Spt Salis. if we give this an expectan of giving it pr Acid we shall be mistaken as

In Spasmodic Comm & Veg Substances we do suppose soluble in Vitr Acid.

In the Elix Vitr Acid tho made with Aromatics yet is no better in Prescription than Spt Vitriol as the Aromatic qualities are Destroyed by the Acid.

Of Ephraetic herbs we have a Mellitic Bath & Sal Martis & fixed Alk. in Sal Ceph. in which form a Mixture of Tartar & Calcareous Earth in indigestible & flatulent in Stomach & Intestines & Vitriol Tartar very much be improper in weak habits as we have full Vitr Salts

As Sapphirina in this Pharm. perhaps occasioned a Solut of Copper in Sal Ammon. this Medicine may be dangerous in Pt times but there is no Sal Ammon used & Alum & Lime mixed in the Alk yet Alk or Mineral Alkalies are little Vol Alk & unites in a little Copper but by heavy or spirits of Air & Alum flow off the Copper & Copper only where the Copper dissolved in Aqueous Shell.

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Aq. Vitriolic Cæsul. is particular as an Acid in such ye to Metalline Earthy Alkali. & wholesome of this medium should be rom ete Acidity & not from & other Ingredients.

Colaio Sphonacea & Mild Alk. order'd wch cannot be united in ye Oil but lets it settle, & is strongly Medicinal & Alk. shd be used tho then for [illegible] not Dang good as it Alk. stimulates & strengthens & relaxes it.

In preserved Bitters Vinegar is added wch bind & strengthens & Carthes but then in Aperients offended cor. Diuretics stimulates tho appt to ye Bowel yet does not aggravate Nervous Power. & Halkali would diss. the Acid therefore may be left out perhaps if long kept together might destroy Carthartics low stimuli. & Volatile if added to them might [illegible] Spirit Sal Amon. prescribed here & dispensed not Acid & Vol. Alk. in ye they should be mixt but Alk. but this Medicine should be used in ye Alk. otherwise a Deper happens & this is only after dose.

Epithem Vesicatories have same objection to as & Simpl as Vinegar is added

Sulph Praecip. tho not some under ye Saline Preps yet shall take notice of it as there is a Salt here.

The Vitr. Acid precipitated w Sulph by union w ye Alk. Earth but Vol Acid should not be used as ye Vitriolic Sellinites is not soluble in Water but will fall to ye Sulphur. & if Sulphur is again order'd to be dissolving c Mercr Praecip, where ye Acid Alk is used, ye Alk will detach ye Selenites in ye Sulphur & Praecip & we shall here have a Vitr Sulphur, &c &c

Lect. 36. on Phlogiston & ye method of generating Heat.

We come now to ye 2d Class or Inflam. bodies

Of Burn. bodies omit Sulph. & ye pure inflamm. Gases

Gives ye a Quest. whether inflam. depends upon some peculiar substance & vapour w. is inflam.able

this is supposed by Chemists & call'd Phlog. this also causes in bodies that won't inflame, & it is probable that the combust. is diff. in the inflammable

The Inflam.ble bodies may be divided into 3 Class

Oils, Alcohol & Sulphur.

Oils are not so liable in W. are found in our Atmosphere as a real liquid, greater. Anim. & Vegt. oils do not flame more in Atmosphere nor do this Class being fluid in a great little more than that of our Atmosphere

Alcohol seems all of ye same species is fluid & soluble in Water

Sulphur is volat. in heat of a good deal less than Boil. Water.

The Oils are expressed Essent. Empyreumatic Other, yet from these Inflam.ble & Volatile are not all of em inflam.ble but ye Inflam. consists in a particular part of em, wch is dest. em by a Chemical analysis, is Water is obt. as well from Essential as expressed, also other Substances are obt. as in Barn. wch we obtain Soot &c

fossile oils in distill" if pure yield only Oil & a fixed Salt which is said not to be inflam^ble but we have been mistaken in Calcin or Caput Mortuum and it is not more simple than Bodies themselves but a Combination of three Elements.

Sod is got also from fossile oils

From all oils an Acid is obtained which is probable if inflam^ble consider it

Other Vol Duties can obtain nothing from in Distill^n as all comes over. but if we put em in a Retort for a long time evaporate & distill we get a white Calx but this not cum^d say is a decomposition but a new Combin^n.

Alcohol in burn^g leaves nothing yet Water is got from it in Burn^g for it Evaporates in Steam & Cold gets W^r. also in Distill^n & Acid in Inflam^n gets Water.

Alcohol tho altogether inflam^ble is a compd consists of Acid & Oil another Proof of Phl^n being not Elementary.

Sulph^r may be all nearly reduced to an Acid as Iron makes a Vitr^l Salt by first making Sulphur Sulph^r wch is separated by Heat then add more and Oil, and much Salt is obtd from Oil of Sulph^r as from Oil of Vitr

Get some Hell Stone & see if it is Sulphur as well as Acid is in Sulphur Art

Phlogiston and by Chemists to be in all our Chemical Substances we shall examine whether it is so or not & first in Saline Substances

The Acids don't burn, which evident that they have no Phlogiston, some Chemists have said Phlogiston make a difference between Acids but that of Vitriolic for instance huomo Spirit if added Spirit we make it Volatile.

We have pretty Acid proof that Spirit is Distilled or other Elements makes Volatile Alk.

What Spirit by Distill Acid will make the same nature as the Spirit of Salt have not been made. Chemists Distill Spirit where Air is adm. it may be Phlog. we are certain it is comb. in Air & Acid but it exists superficially in Spirit. that it is superficially is evident in Salts here, in Distillation was distilled in an bilings of the Acid afterwards more pure, & the rest Dist. might be got shifted here.

The Spirit is intimately combined with Acid & makes Acid & Acid. Therefore there is little Phlog. in at least it is not necessary to constitute Acid.

In Alkalies we don't know if there is any Phlogiston it won't deflagrate Spirit is has been a made a mark of Bodies cont. Phlogiston

It is not contained in Fixed Alkali nor Volatile Alkali nor Spirit of Salt &c. it is proved are entire using Chemists Common,

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The Vol Alk. perhaps from its Volatile, not bear the [illegible]
but its combinations with acid Ammoniacal Salts
wch prove phn to be in it Vol Alkali, & Alk. of
Nitre & mur. acid is fixed Fixible.
This is the only Saline Substance in wch the phn or Sulph.
of the Chemists exists.

Phlog. widely exists in Nature in the Bodies
it is that wch inflames & burns & supports the Chem.
Differs from Common or Inflammable Air.

It exists in Metals as we can know as we did
wth the Vol Alk, i.e. by deflagrating it Nitre & Metals
will thus deflagrate except Gold & Silver, this proves
phn in cm in deflagrations to Nitre be it Earth.
But these Metals be other substances wch unite wth the
Nitric acid possibly wch may corner unite wth the acid
Charcoal & produce this Effervescence yet this
is only supposition, & phlog. certainly exists in
the Metals, Experiments of flammation, deflagrations wth Nitre
as well as many other substances.

Vol Alkali does exist in Metals certainly is
not an Elementary substance as we can reduce
it Calces left after deflagration into Metals again
without adding phn & this in some of the Metals Gold
Silver, Gold, Copper & wch we do by the strong
mid fire in a close.

It is probable from what we have seen before, that
this may form one of the Elements to probably is a modification of
Air or one of its Elements as Sulphur is reduced
to an Acid Phlogiston the inflammable also in Charcoal
or mg. Gas burning or decomposition of any Substance
after Water is gone off in a Volatile Acid is
generated wch have & renders effects of Phlog. we have
by other Experiments

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(a) tho' nos ane ignorant cabal of mag. la

We have no proof of ye Earth exciting in any other Earths they wont deflagrate Nitre as Calc Stones or Clay or Chyle calcine Earth; they hinder ye Calcin. of metals, as they probably attract ye Phlogiston from the Sulphur which seems probable Metals do in Calcination.

This ye therefore a Chem. but not a Physical Element.

The 2 Substances they supposed to be acid was ye Sulph. or Mercury wch is absurd as in inflam. Sulph. the Acid was called Sulph. or whatever is short and deflag. does comes over. tho indeed a number of these are our Chemical Elements

All Bodies by Calcin. and Solution to Earth ~~have Earth expressed~~ ~~Earth~~ wch is certainly a Combin. and Metals when calcined gain in Weight. as Lead for more than this Earth of Chemists to also an imaginary Elem.

All Bodies who had a Taste were not dissolved were said to have their taste owing to their Salts here do indeed give tastes yet many have tastes without any Salt Calc. Calc. Earth &c

Water also said to be a Physical Element

Hence we see the little foundation for ye Physical Elements of Chemists. ye Phlogiston is frequently called upon as one but Phlogiston is an Element indeed in itself as in diff. Bodies as Sensible Substances that Phlogiston differs from Fire. & that may be gained means wanting be supposed Doctrine of Phlogiston in Air.

I have been disputed by Chemists whether this heat is a Body or Substance or a Body or something but in motion

the Bod is incapable of being heated to a certain degree some more & some less. Some cannot be heated above 100 Degs. of ☿ the other 212. Bodies that can receive no more heat, this did to this cause, y all the Pores are full of Heat. what receives more suppose thro it

Further tis probable y heat is only a quality, not hot in itself only heats y liquor, because when any liquor is quite boiling, y Bottom of y Vessel is not hot.

all Bodies are expanded by it. hence they are
that it was a Body, but this may be by dephlogist
at. it is also a Dr. shaker of Electric Matter to any
thing but an affection of Bodies in motion.
The only proof it that it is a Body is its being Distill
Infused in Bodies touched. Idea of a Vessel as one in
a Glass Vessel of Wr. is suspended contrary to gravity
& Pipe also passes thro' it Water.
This may perhaps be ow. to all Vapour generated
yet this don't act: for if Water is not become hotter
Other Substances as Air are for instance boil in the
same manner as Water. Br. Bubbles come thro' it
out +

Heat generated in many ways as a Vehicle
Light, as rend. Fire &c. all if collected as it become
a ~~generated~~ Fluid hence this probable. It is a Body
and leaves Bodies w. can increased weight.
It then seems to be a Matter to Electric Matter. Air
Vehicle generated by Bodies not contain it
It Air not to respects Bodies like Electric Matter
at the same times.
It is agreed wh. whether it is generated from the
Bodies or accumulated only, we can't conceive of it
being accumulated i.e. ~~the~~ existing in all & being
collected from some of the Bodies as the other Bodies
don't cool. Br. happens in Electric Matter as
if ~~accumulated~~ accumulated from Bodies they are left without it
Some say that the Rays of Light or Sound
only an affection of Bodies in motion this is probable
and is only Electric &c

Another reason to believe that Rays of ordinary warm hot is, that they do not heat all bodies according to as all hot bodies do. As the Sun's rays and Burning Glass against hot bodies, yet near that focus or at ⊙ it is not hot than of most remote parts. or if the Glass a B is taken away & piece of Iron applied to its place tho it receives all the Rays yet will not be heated as if applied to the focus

(a) the Bonomian Phosphorus after B^s applied to the Sun gives light but no heat

Exp.ts of 3d Dny. Method of generating Heat.
or Accumulating it, or giv. that Motion to Bodies
wch produces Heat

The 1st Dny. of Jun is by the Rays of the Sun
by Friction, or Attrition, & by Percussion
The 4th Dny. Action of Fire upon the Pabulum, & 5th Dny.
Bodies of Animals.

The Rays of the Sun not in which warm but only
have the power of heating Bodies and their proportion
to their density of Bodies. that the Rays the more dense are
not hot seems good from the following Experiments
1 Bn of Tapers of Mountains where the air is rarefied
tho' as many Rays fall upon any surface. Some say
this is owing to the rays on a Mountain not being reflected
as from Earth beneath where the Surface is unequal but
this not true.
Any Body as Iron for instance if heated thro' nice
round it by the Rays of the Sun the Rays heat Bodies
greatly when collected in the Focus of a burning Glass, yet
mentioned, as they tho' no heat rounded, as for Exp.
Vol 2 p. 4 a to the focus will be the greatest heat
Convex Glass
Concave focus
Body applied
Rays of light & of Heat are different. & one may
be generated without the other
It is a question whether the Heat comes from the
Rays or Light & the operation produces.

That it is not especially in the Rays of light is evident for
the Moon gives light not no heat, ~~& Room is enlighted~~
~~by the a Dozen lights but not heated~~ (a x

N.B. Thro' Burning Glasses are commonly Mirrors placed in such a manner that the Rays reflected from them are collected in a Point. The People of Syracuse burnt the Roman Fleet by such a Mirror.

Polished Bodies don't generate Heat so much as rough ones because they do not occasion that Motion in the Parts as though ones in breaking off the rough parts of the Surface. Glass may be cut smooth like Paper when dipt in Water which destroys the Motion wch otherwise communicated thro' the Glass would occasion it to be shivered in pieces out of the Fire.

If Iron on filing wheel between two pieces of Wood the Heat is produced there, whilst between two pieces of Steel, in the former case the Motion is destroyd in the latter increased.

Shall Rays of Sun may generate Heat they must fall perpendicular to Earth hence tho' we are nearest Sun in Winter, yet from obliq of Rays render it lis less warm

The greatest Heat is generated by ye Burning Glass hence Gold be in France made Volatile & vitrified by strongest burning Glasses. Rays coming from ye Sun or Fire heat some colours more than others viz those that absorbed Rays yet Black and this may happen when there are no luminous Rays Yell to Black are deep Blues Violet Colours &c

The 2 Method of Gen H is by Friction diff from ye Rays of the Sun & cant do it by friction tho some have said all H to generated by Friction

Two solid Bodies rubbed together in a Pump generate Heat. Two Fluids rubbed ever so long or shaken ever so much generate no Heat, unless when Air or Water Blue bellows that they will generate no Heat.

Neither will a Solid & Fluid rubbed together over generate H. nor even a Mercury & Fluid where Spec Gravities so great.

Neither will two Solids shaked together in a Fluid generate H. especially if their Gravity is not much more than that of Water, unless upon rub em forcibly against each other under ye Fluid then a little H. may be generated

It seems necessary for Gener of H that one of Bodies should Vibrate themselves

Hence some Bodies are easily vitrified & Steel is not easily vitrified nor is Flints, yet Earth struck together a Pearl is vitrified both very hard & Elastic.

A Hammer beat against another piece of Steel H is generated

repeated strokes

The Vinous Fermt. generates it especially if in a great Quantity but this & the Acetous doth come up to the Saccharine in ostensible sort & while remaine in fire as in Whey Meths or Corn

The Putrefactive Fermt. generates no Gas at all, it metts in Putrefying Bodies but this is now to the Saccharine & Acetous (as Bodies that have gone thro' their fermentations generate none) is gon in part of substance into another Barland or gon & lost in Fermentn.

The 4 is the Action of Fire upon its Rebellion as in burning Fuel. Hold this generates air in great Quantity we can't tell but Dumb. it lay'd Solut'n of Pyrolig'n into Air & some occasionally by Calcination of Volatile Vapours it is certain that Volatile Vapr generate Air

Air if we distill'd Marine Acid from Salt by means of an Alembic from it & fumes be made to pass thro' Tobacco it's concentrated Acid & purifies it but if Air is made to pass from the Acid it's generated & Air was said to drive off Phlogiston & let generate the Acid

All Fuel in order to burn must have Liberty of Air & gether better, i.e. to speak Chemically, it must of Mon'st'n yon thro' on & feeter & more air is & Solut'n performed & more that of consequence is rod used.

But Air once detained well not do again Also Bodies dissolve more readily in a Fluid or Air than in a Solid & least and ea not at all & Phlogiston must therefore to burn be raised and Heat & Light

Exp'n. A Candle may be put into Alcohol without setting it on fire upon dipping principally not to heat warm & raise it's Vapr from the Alcohol, but it applied to its surface so as to warm it & Vapr immediately arises in the Air & if this is enough we smell & Vapr don't touch the surface of the Alcohol —

a) Hyg. The Fermes or Exp. results from if generally great & Cases may be drawn by the Thermometer upon Food mouth of Political

But if two succeed they are rubd not H^t is not produced.
Hence it seems necessary for the ^n of H^t in Attrition or Friction &c

This happens more especially when the Bodies is rough & the parts by Attrition rub'd off are in Chips or Imery or a File & Steel.

Hence if you hold a Body in such a substance as prevents Vibr^n lest it Heat generate as if you put Nail in Water or Clay & then file it.

Hence as Vibration is necessary perhaps this is the reason why Fluids don't generate H^t as W^r or any Solid Bodies can't Vibrate because when Fluids Particles of Bodies are at a greater distance than when Solid as Ice has its Particles nearer each other than Water &c

Neither can a Body Vibrate in a Fluid therefore it Heat generates.

When Bodies are rub'd together H^t is not equally generate in Both but most on the Fluid is still as in prod^g H^t by the pressure of Water so the one Vibrates more & Vibration in any moveable is destroyd by its motion in a Fluid.

We may here take notice that the Vibration and Heat itself; as some have said that H^t is only a Vibration. but Fluids can be as easily heat as Solids tho' we have proved they don't Vibrate.

The 3^d Method is by Chem^l Attract^n or Solut^n of one Body in another as not only H^t is generated by this but sometimes Cold. As Oil and Vit^l generate H^t

But

It is not uncommon for solut^n to require a certain degree of heat for ons lodgeing th^at in dissolv^g Steel belongs to Dr Stoshi Detailed of Steel produces no Steel immediately when being made but if Steel is heated a little before it great Steel is generated.

Also if Phlogiston cannot not be heated before it can burn this is well illustrated by Stahl & Hugens Deflag^n is only a solut^n of Phlog^n in Acid but this dont take place till the Metre is heated to a certain degree & then fire is generated.

Hence also probable from ye Air being saturated with Phlogiston & ye same Air not answering again until Fuel requires fresh Air that ye Generation depends upon a solution ~~of Phlogiston~~

It seems necessary for Phlogn to attain a great degree that Phlog^n should be mixed with some thing solid as Earth &c. generated & Fire again accumulated in it. As Alcohol & Pitcoal differ much in ye degree of heat generated ye Pitcoal wch is mixed with Earth retains ye heat much longer & ye Alcohol soon fire heat & Earth retains ye heat more than ye Alcohol which is apt to generate more heat & soon

Phlog^n uncol Phlog^n in burn scarce give any heat as is shewn by ~~[illegible]~~ & ~~[illegible]~~ longer & then fire & other ~~[illegible]~~ not ~~[illegible]~~ much heat

In order to ye action of Phlog^n upon ye Earth or Fire ye solut^n must first be performed, & ye Fuel on one way of ye 3d Fuel on fire & the Air by ye Electric Matter th^at strikes th^at ye Inner Electrified against ye Vapour of Alcohol a little warmed ye Alcohol takes fire

This is a good Arg^t for Heat being generated by ye striking of Electric Vapours and much more when assisted by some

Under

but that Amm: in ye generate Cold. Also ye
Vitriol Acid added to ye incorporated form as Ice
Cold is generated.

We poured upon Lime water & red hot
Vitriolic Acid & Wet poured together an Effervescence & Heat generate great Heat — Last Experiment overthrows the opinions of those who say all Heat is generated by Friction & Friction happens where fluids. Also if friction produced Heat it would always do it wherever that Amm Water gen Cold. Neither do these Solutions where there seems to be if great Friction generally most Heat as where there is an Effervescence & there is certainly greater friction but as Heat is generally in mixt of Caustic and Mild Alk is induced.

Why Heat is generated by these means we can't tell it is a Law of Nature —

From no Theory cannot tell ye Solutions generate Heat but from Exp we know them that do

All Acids mixed with ye Water or undissolved amongst Substances except Ice generate Heat

The Acid Vegetable dissolved in ye generate Heat. Acid fixed Volatile generate Cold. is Surprising in two so near resembling each other, therefore we are not Judge from Considerations + they will generate Heat

All ye Salts Metallic Salts & Earthen Salts dissolving in ye Water in mixt with Alkali or Mineral Salts generate Cold.

To this Class we may refer Heat generated by Fermentations but all of sorts don't only 3 as of Fleetous Vinous & Saccharine, Corn Malt Fruit in ye is of Saccharine also mild Ferm of Flour. So this degree mixed with other we may refer to Putrefactive Ferm of Vegetables all of which undergoes of Vinous & Acetous Ferm: (a a a)

Under this Article of Freezing which we shall take notice
of raising of Cold we have a Scheme of Mr Cavendish's doings in
and shall narrow it down to the Bottom of Mr Boyle's Experiments
Bodies in Freezing thus made from Solid to Liquid
or Fluid to a Solid form, in Boyle made many Experiments
on this as Snow put into a Phial & warm Water
or Cold Water put to it thus it dissolved the Snow & yet
it yet a considerable degree, as is evident by the Bank from
and Water & that is, is it Water in the Atmosphere rarefied
and Cold condensed by the Cold generated
by the Cold.

Another most curious Method of generating Cold is by
changing fluids into a state of vapour as here shewn in
Ether being poured upon a Ball of a Thermometer, it fluid returns
into its Ball by Air and being condensed by the generated
by the Cold of Ether and this happens in all Fluids.

From this many Curious Phenomena may arise
One particularly concerns Spirit of Wine which is in
the Hot Season get out by often boiling and it is by
general Cold by Evaporation of Water therefore when one new or far
taken, Evaporation is greater we drink liberally & eat
We should dry ourselves therefore the Force of Fire & Air
Circulation leaving no Water to be Evaporated.

Dr Hales proposed an Expedient to prevent this that he knew no
how it succeeded) and that was to Distill Salt Water
fresh & with great difficulty parts with the Water and perhaps
volatile quality also in observing Effects of Cold.

It is evident from this that Land Winds are no Cold Winds that
Land being very strong blowing over Continents & our Land
being most hence an Evaporation & the Generation of Cold

The

No 40 The Next Method of generating Heat is by the Animal Power and we shall here be accounted for, by the Power of the Machine. It can't be owing to the Rays of the Sun (3d we proved 1st Method) striking upon the Skin as they don't do that at all times, neither can it be owing to Friction for there can be no Friction in the Body as we allow of their striking against the Vessels or vice versa. Or, it by Blood striking against itself. Nor can it be owing to the Blood striking against itself or yet against Globules can possibly generate Heat as we have before mentioned.

But some may in Opposition to this that the Blood is not a uniform Body, but consists of Red Globules and Serum and if Red Globules may be considered as Solids, & by their Friction producing the animal Heat. But if Red Globules seem only to be distinct from the Serum in this one particular viz, their not being soluble in it, and not as more solid, because in Oil & Water shaken together if Oil is reduced to Globules signifies, 1st Globules are pretty equal in their sizes also not the Red Globules 2d therefore seem to resemble Oil.

Even suppose they were solid they would not generate Heat any therum is Varied & permit them to run fast enough in order to produce Heat by their Collision, Besides if they are solid they are so flattened 3d we have said never produce Heat when solid for they as in Ice.

Bodies Bodies of any sort reduced to so small a size as the Globules are, cannot produce Heat in a fluid even tho' they are solid & Elastic, to Illustrate for Example the Sand as Elastic a Body as any shaken in a fluid 2d it is then, as Water, won't generate any Heat.

So further we endeavoured to prove a Priori that Heat can't be generated by Friction in the Body, now a Posteriori we shall endeavour to prove it also.

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VI. Is Animal Heat owing to Friction in ye Body, ye Heat would be greatest when ye Frictions greatest, yet ye Cold ye Heat is greater yet ye Heat is less. the same may be said happen in ye Gems of Fire, where we shall have strikings & tho' ye Heat rendrs nearly ye same & sometimes indeed exceeds it.

Lastly, from Friction after ye Body was once warm ye Heat would be encreased by ye continuing of ye Friction in our Bodies, tho' in opposition to this it may be said ye Coldness of our Atmosphere prevents this, but in warm Countries as America for instance, where ye Air raises ye Thermom. to 104 yet Friction generates no more heat here, yet ye Body and contrary is colder than ye Atmosphere, sometimes being no more than 98 degrees Hence it would seem that Friction here generates Cold. Sir however it does.

Can it happen from Solution? we may say it can't as there is no solution goes on in ye Body except a ferment in the Stomach, yet ye Body all over is equally warm & ye Stomach after the fermentation & ye Food undergoes after passing into the Blood is ye Part one of ye generators no Heat. hence Heat may be owing to these methods of generating it nor can it be owing to ye action of Fire upon ye Pabulum as it undergoes publicly solvent.

It must therefore be owing to some particular Power distinct from the other Powers of Nature.

It should seem then that we can't partially account for it from ye Nervous Power as we daily see that where ye Nervous Power acts more strongly in ye Heat is generated as in Spinal Diseases &c or ye Face in shame is here red & blush, ye Vessels being made to dilate more by ye Nervous Power & more Blood is brought into ye Cutaneous Vessels than usual, tho' ye Arteries going up to ye Face don't at that time really beat stronger.

Also in ye Case of the Lamb, the Circulation goes on yet the Lamb is cold.

Menst[m]	Solvents	Means of Solution	Effects or Result	Subst[c] Generated
Expressed Oils	Nitr[c] Acid concent[d]	Addition	Sapo Nitr Express	By Distill[n] Fluid Nitr Vol.
	Nit[c] Acid	—	Sapo Nitr express	m[y] y[e] y[e] Oil coagul[d] but remains swim[g] on y[e] top of Acid
	All y[e] other Acids		no effect	
	Fixt Vol Alk	Alkali Caustic Boiling in Water	Common Soap Sapo Kali Expr.	
	Fixd Fossile Alkali	—	Alicant Soap Sapo Natr Expr.	
	Vol Alk	The Alk caustic Digestion	Sapo Vol Expr	
	Essent[l] Oils	Addition	Fixt Oil	
	Fossile Oils	—	—	
	Ether	—	—	
	Ol Dulc	—	—	
	Sulphur	Boiling	Hepat Sulph Hepat Sul Exp	
	Alcohol	..	no Effect	

The Nervous Power is increased by Alcohol & increases Heat afterwards. This we refer to Excess & stimulates the Nervous Power all over the Body & thus generates Heat. This Effect we might not see from Friction & had not reflected that already.

In Inflam. Fevers & Rheumatism we have shewed that Stimulants very strongly avoid have endeavoured to prove that Inflam. is owing to strong Action of the Arteries & if Acetic greatest in that particular place the Arteries going to Inflam. but faster. Hence Inflam. always to be treated in Friction was must be left.

Wine containing Alcohol & Alcohol itself makes the Nerv. Power act strongly over the whole System. As when a Man is Drunk he does not feel much cold or great Heat being generated. but what is very curious Alcohol in a certain degree not only generates Heat but regulates it, it generally makes it between 96 & 98 but from Standard of Heat that it never can be more elevated.

We have spoke now of diff. Methods of generating Heat, yet How this generated by any one of these we can't say.

Lect. 38 On Essential Oils &c.

We now come to the Simplest Inflam. Bodies such as we call Chem. Elements shall an in other part enlarge later. Give the Material Heat Chem.

Inflam. Bodies divided into 4 as Oil of Sulphur, Alcohol & Sugar, the last seems rather a compound Bitumen & should be ranked accordingly but as Alcohol is got from Vegetables under Vitric shall treat of it here.

The Characteristics of Oil is their being Clear inspid & Inodorous.

Menst. 589	Solid	Means of solut.	Results	
Exp. Oils	Fixed Salts	The Alk. caustic Boiling	Soap Solution Ferments	
	Lead	Fusion	Carbonate Plaster	
	Alkaline Earths	The Earth & Boil	Sapo Sellin Expects	
	Alk. Earths	—	no effect	
	Water	— —	— —	
Menst.	Solid	Means of solut.	Results	Acid Salts
Exp. Oils	Vol. Acid	The Acid coperent Addition	a Black Ferments or soap	generated distilled a Vol Vol Acid is form
	Act. Acid	and diluted lo exercise Commixture	Sap. NW Chemical	
	Other Acids	—	no Effect	
	Fixe Veg. Alk.	Alk. caustic Boiling in Water	a Soap Sap. Mali Ferment	
	Fixe Mineral Alk.	—	Sap. Vitr. Effect	
	Vol. Alk.	the Alk. Caustic Distillation	Sap. Vol. or Sp. Volatorum Chemical	
	Exp. Oils	Addition	a mix. Oil	
	Imp. Oils	—	— —	

Oils are Essential Empyreumatic or Fossile

shall begin with the Expressed as best known and Common

The Expressed oils from a Vegetable also and Animal but not of a Fossile Kingdom. They have gone under diff. names

as their properties are similar when Purge are clear insipid

& Indorous, some are more fleet than others wch is ye only

difference known between them & depends on some thing

— circumstance

They have had diff. Names from being obtd from diff.

substances, as from Vegetables called & expressed Oils from Animal

bodies Tallow or Suet, & Lard from ye Membranes from

& Chyle called Butter from Fish Fish Oil & Spermaceti

Oil. Empyreumatic Oil was generally got from Spent or

expressed, hence if we find ye Empyr. Oil in Det. we may

the substance consist. one of these Oils.

We seldom meet with ye Expr. Oil so pure but they may be

distinguished from one another as Linseed from ye olive

this difference is owing to ye Oil with all seeds & fruits

the Mucilage is squeezed out as well as the Oil, besides this there is a Mucus in ye Oil

wch gives an greater degree of Tenacity.

However we may prevent ye Mucus, upon Oil is Volatile

& Oil not, & Mucus soluble in Water & Oil not & ye

Mucus is dissolved by ye Alkalies

Thus shall find pure we boil them with a small quantity

of Fixed Caustic Alkaly but in small quantity least it

should shew first of ye Oil also but if pure it produces an

Empyreuma as we see in Linseed Oil, & Alk. also procures

in some measure ye Empyreuma, but this we can only do

to a small quantity of Oil as a Quantity as an Empyreuma

be occasioned.

However Warthington in his Treatise Medicus

Olei & Olfactus Unguentum a little pure prevent

Menst[a]	Solid		
Effec[t] Bils:	Fossilibils	Reddens	a most Bile
	Other	—	—
	Oil Dulc	—	
	Sulphur	Boiling	Bals Sulph Terebin anis &c Bal Sulph Ferent
	Alcohol.	Addition	Tinctura
	Metallic Substance		do not restore Health long as not ne[cessary] hence used in Enam[el]
	Lead		
	Earths	Earth Carbon[ate] Boils	
	Other Earth		no Effect
	Water	soluble in small quan[tities] as in Dist[illed] W[ater]	~~no Effect~~
	Copal.	after Bg first dissolved in Balo Cap.	Copal Varnish.

their growing so soon putrid for this bad Inconvenience their putrefy & is very offensive & bad wth Infection
Dep^t: This Oil putrefy a solution of Plants Milk in 8^h: & Oil wee made white, and of consist to a gentle Heat it answers Butter,

The 2^d way they are got is from Animals & this in 2 ways from Membranes Membrane & from Chyle in of Butter
min Milk accordingly lately given wth a particular Form: produces Cream then Butter.
When we get them from Cell^r Membrane we make them
liquid & prepare them using a little Heat, & make them separate
Oil else if soon fall contract an Impurecuma, therefore
are to be healed in Vessel not by Ambeloes but by Warm
water whereby Oil gets only a little Heat then passe through a
Bag & Warm out & then Expose agn. but still the Leaves
here is Necessity of part of Chyle also. When Bile & Oil this
that given Parte Smell either to Animal Substances or
Vegetables, in Men to be separated as Jaspar said before
by Alkali.
The 2^d way is from Chyle as Milk exposed to Air separates
Cream wth is Oil part becomes to be by Air wth Hot water
only so as there is a Leather separ^n from a Combin^n: this is
wholly from Vegetable acid is not yet made into an Animal
Nature therefore sometimes call'd Oil of Animal: sometimes
Oil of Vegetables. This is accidentally fluid by alcali & Therefore
other and is nearly fluid in Furnace &c.
This Butter contains Spirit: Oils of Plants wch are
separate for and former Cake as also formed Mucus,
Oil got also from Cell^r Membrane & Tendons wth they
get from Cells in assists a great Degree of Heat also this
generally a considerable time before they extract it wherein
it gets a Rancidity. Boiling this wth Alkali & wee
deficated, Mucus Destroyed Impurecumes of Putrid & smell
& Colour becomes clear

(a) 598 Noe Tenements of ye Vicar and mansion v Pedigr cons
yet deducted

This Oil of Fishes differs from ye Fish in Lizens differences
Oil in warm weather except freezing it also differs from Men in
being a noble of Mixt Salts & in ye Sperm Oil is also
contains ye Bulk of Sulphur in considerable Quantity.

Vulcan often mixed allegs ye Fish & Horse often
found in them in such parts where a spare & great is allowed it.

Mr Boyle generally made a trade to let Fish Oil stand 20 or
8 years & from ye Sperm Oil in ye Chemistry alleged alcohol & Spirits
To purify ye Spermaceti mixed it is to be boiled in Lye
alk in which solution Filtre it thro' Bags & repeat it
Procure for 6 times & Sperm Oil Cannot it was to
ye Water from Chrystallizes

The Oil from Birds seems to resemble much that of
from Fishes, & also chrystallizes by ye Sperm Oil

Lard & Tallow got Oil from these diff^t substances they
only differ in being mixed in a more or less degree of
as Stearin Oil & most neat Tallow Lard & Butter

Fluid they are issues as fully drawing & Hindered
of Solid are always other

These Spirits Grad & illy them that of W^r, they
are all original fluid in a degree of Oil from ye Coal
Water

Spirits Purest Then prevent Inflammation
in Bodies

but often Comb^n Mixed the Vapour Oil & Spirits
be Solicitous in Appertenances Mixed is we should wash
out as soon as mixed spirit want to keep them long

The Eats of Animals are prest pure mixed Spirits
hence keep long with Turners Yellow to Period Bad
from Veget consists here as a mixt of Spirits soon
putrify & evaporate to ye Air & Oil keep Properties

Wh^n Volatile Alcali they make a Black substance
of which know little only this Matter can under 8 Spirits
without first mixt with a Dose Lay generate Air & Spirits
i.e. This Lemon & Oil & Blood has been made as a Stimulus

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but we know little of the Chem. History this said to yield a volatile Alk. some dayes ago & shewed

One things in particular w.ch I found best & most that more will unite w.th & pass into a stat. ~~of the vessel~~ Water Lather w.ch was dissolved & dissolve in w.th (~~with separate from~~ Water) & Potash upon ~~[illegible]~~ Water swims & then and no solid coagulates & is then like the other old Oils with the other Acids they are not soluble w.th w.th &

Without Alkalies they dissolve but only & Crystalizes into Soap w.ch we shall now consider

Soap is a vitrid subst. soluble in W.r decomposed by Acids does not affect Metals. The principle use what Soap is for to suspend Oils in Water w.ch does by its vis equitis not as dissolve Chemical since solut.no. Gums now sometimes used.

They are made Artificial never found, Naturally tho & Gums Saponaceous are & serve to many sentences but & Alk. & Oil never found together natural

Many have given these Saponac. subst. & Gums are mag.sm to contain Alkali.

Another property of Soap is its Electric att.n w.th Water, by w.ch they may be seperated from & Oil w.ch adhered to em & may be precipitated from W.r by Neutral Salts w.ch have a greater att.n to w.th W.r we use Sea Salt mix them & get em out dire & Soap seperates

Soaps differ according to Oils thus are made w.th w.th & Depressed Oil w.ch they can't be made solid, unless & Oil is first purified as in Sperm Oil w.ch makes a very good & solid one.

The Expressed Oil don't dissolve N. Salts but easily dissolve mild Spirit & Essential Oil & this in any proportion a drop of one in another. So with Sulphurs they

a) if dissolved by a similar dissolvent as an acid
Volatile Alkali &c

make Balsamo Chymicis.

They don't and then dissolve metallicks

Then dissolve most metals or Mineralls but especially
lead into Empl Commun by means of ye they wd dissolve
it into metallic form but requires more heat

Then dissolve Calc earth or Lime into a Sort of
Soap but right found other
Not capable of being Volatilized can't be change into
Vapour if we Distillem come over in form of Impyreuma
where properties differ from ye Lapis & Calcis

They may be decomposed by Acids from ye Alkali in
ye Soap but then they are Impyreumatic as ye shell from
ye Soap made of Lime, & it comes over Empyreumatic
Somewhat

Lect.re 39 Spirit Oils.

The Essential Oils found in Lemon & Orange Chapter
are ye Scrapped are they generally have ye pungent smell
old Sebolance from ye they are taken in ye Smell, being oily
so them they were supported by ye Spirit
as well as ye Smell hence called Essential, called
also Distilled Chemicals

They were little known by Ancients till Chemistry
began to flourish hence their name Chem but ye Arab
got em by expression but not in their pure form
They made many Experiments.

They were said to be one of ye Elements of Plants but
not are always found in Cells operate they emerges
Oil are principally in ye Barks of ye Leaves of ye
Fruit but are not ye Fundamental Principles of Plants
They were said to be ye Fluid Flowing of Plants in particular
for ye Preserving of Plant Warm not ye Feeling of Cold Presence

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8°. 1

that they are not warm of themselves

Got by Expression out of Seeds: many be got from the
as from Flowers of Fruits, also may be got in such Flowers
Flowers is Sugar. & by distilling & set in the Sun or
They are most freely got by Boiling & Infusing of Herbs in
Water

Exudes in quantities from many Plants Balsams
These may be drawn out by Infusion or Distillation
Addition of some new Substance that may be got pure
from Balsams & Resins by Dissolution.

They are got in greater Quantities from some Plants than other
Plants & from some parts of Plants & got in greater Quantities from
Dyoecia that have of these penetrating Plants
Seeds & Barks & Umbel: Plants in the
Seeds in the Roots in the Flowers &

That Parts of Plants consume more in growth & not
whole Plant but in Proportion to quantity
must stick to Seeds & produce an Imperfection

Weather not indifferent to Plants some Plants
grow in Dry Weather stronger & yield more Oil than
in Wet & Weather Coasts out perhaps some Herbs
should be gathered in Dry Clear Sunshiny Weather & not
in Morning in Forenoon they yield more Oil

They should be gathered at different times according to the Part
propper season to yield Oil as the Flowers Leaves or Fruit
should be cut down when Flowers begins to fall

Those that contain Oil in Seeds, Seeds other Flowers together
when dried shape but before they drop

The Flowers should be gathered before
Turpentine & Resina are chiefly of Pine
Gums generally of Oil & besides the Essence & Juice

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as those smell stronger when just blowing —

Both Leaves, Seeds & Flowers should be dryed a little before Distill.n because of Natural Juices prove stronger & solid.o & yt bil thus Water hence effluent & oil is not so in consequently & have much less Juices from wch it is separated w.th more difficulty than from Water

When found Barks & Roots a particular time should be chose for gathering as Barks in ye Spring contain a Saltarine substance w.ch is to forment & fermentation of Plants

We should take ye Barks Wood & Roots most after ye Leaves are full blown & should also be dryed a little

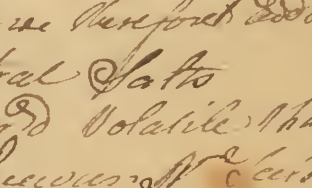
To separate ye Oils which are not contained in Tubes of Plants Lution Cells as in Oranges & Lemons these Cells should be broke before distill.n otherwise ye Oil wont be obtained so easily. We must cut & macerate ye Plant because ye Seeds a good time before distill.n By Maceration in Water ye Cells burst & the Oil floats in ye Water, but Plants when macerated are apt to run into Fermentation so soon, and otherwise we therefore add subst.s to prevent this as Acids or Neutral Salts

Some are more easily rendered Volatile than ye other, ye former use put Acids, & ye latter Neutral Salts for Neutral Salts makes Water capable of dissolving a greater degree of Heat & therefore will be ye best to volatilize ye heavy Oils

If we add N. Salt Common Salt is generally allowed we should get either very pure or none at all. Both prevent ye Putrefaction are then to be distilled

But on acc.t of their Volatilities diff.t Apparatus Heads & Stills are necessary

For those yt are heavy, we use this whose Size is lower, & for lighter we use the Top B. whose Size is higher by ye we get ye Oil clearer &



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(a) But the smell may be restored by distilling them wth g^r Dilute Nitrous Acid, and this is Chemists practice when many of these Oils by long keeping have lost their Smell —

Some are heavier some less heavy than Water
Those that are lighter than Wt. are more Volatile &
perhaps is only on ye lighter liquid oil therein which
that are heavier & lye at ye bottom requiring first to be
made into Vapr. before they are Volatile &c.

After this they are to be seperated from Water
by a Seperatory. these seldom done by Private Chemists
for want of a Sufficient Quantity of ye Substance as ye Genuine
from ye Dutch Lavender from Germany or Nut for
can't be sure of ye purity. tho' Spirits are generally got adulterated
wth is only to be distinguished by comparing wth those that are
pure.

They are adulterated sometimes wth Expressed Oils sometimes
wth Alcohol tho' most commonly wth cheaper Spirit. Only ye
two former we can distinguish. If wth Alcohol Water
added will unite wth ye Alcohol & detach ye Oil. also when
mixed wth Expressed Oils cast to distinguish them & Spirit
being soluble in Alcohol & Expressed not. both opposite
here shewn wth ye Oil of Rubini.

But this not so easy to tell when they are adulterated wth ye
cheaper Spirit wth ye most common Turpentine wth is not
at all soluble in Alcohol. but when dissolved in another
oil it becomes soluble.

When procured they differ in their Smells principally
in being thicker & thinner but not in their Medical
Properties they differ also in their specific Gravity
but they don't differ more from others than Farinaceous Flour
and differ times and Ethereal, & ye oil of Turpentine for ye.

They contain ye Essential Oil of ye Plant & its properties. The
Spt. Fector of Moorhouse is ye Smell of ye Plant
if ye Oil is exposed to air this Spt. flies off. Oil (a)

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are generally fluid in our Atmosphere & offers not
a degree of cold they require to freeze am. of Oil Olives requires
They are generally clear some are yellow & is deeper
according to how hard used some contain a Colour, as of
ol Cheum is given but may be got lessened.

Applied to other Substances —

They are soluble in the Vitriolic Acid into a black Mass
& other Oils & generate so heat so as to make the Oil Boil

They are also soluble in the Nitrous Acid & sometimes
generate so great heat as to set the substance on fire as if
the Nitr. Acid be concentrated especially the Vitriolic Acid.

The Combination thus made have been called Examine
they made something like Ether

That the Vitriolic Acid in Destill. yield a volatile
Vitriolic Acid.

They dissolve in the Fixed Alkalies into a Soap but then
loose all their properties.

With the Vol. Alk. only they make a Soap but retain
their Properties as in the Sp. Vol. Aromatic offensive
Lens not soluble in the Neutral Salts except Vitriolate & Tartar
Regenerat Example of ol Sinebinth. which was dissolved in
Vitriolic after the fixed Alk. is added a Tart. Vitr. is formed & also
dissolved & the remains dissolved in water: the only way of dissolv. Camphire is to
retain all its properties

They dissolve Resin of Jalap in any quantity —
They also dissolve the Empyreum. Oil

The more Pure Oils dissolve also the more impure some
as Resins & Balsams hence they are found for Varnishes

Gum Copal won't dissolve nor unless first joined
to Balsam Capaivi & then does this wed in Gaithes not
soluble most of Turpine don't excep. red Oil &

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They dissolve Sulphur into Balsam & Sulphurous
They don't dissolve Metals they perhaps might do the
Calces if they were not so Volatile.

They don't reduce the Calces of Metals but in Madeline
form as Expressed Oils do hence used by Enamellers
who mix em to their p.t as Water is too flood Evapt & Expressed Oil to
They don't dissolve Earths

They are all soluble but in small quantities in Water
hence in Distilled Waters in Shops. but in these gelas
Impossible hence Infusions of Plants Better as Medicines.
Inflammable may be got from all of them in Crystals
as Sperm Cali from Expressed, Hence Camphor is
got by Cetton in Sicily Boxes, but Camphor does not
differ from Essential Oils only in being finer & free
from Wr. Water & Garlic smell of itself.

Differs from em in being Volatile & perfectly
Sublimation by itself whilst Differs are decomposed
as Expressed Oils. But when applied to other Sub-
stances don't differ from Expressed Oils. but is soluble
in Vitriolic Acid and Alk but not Water or Leg
is soluble in small q in W. giving a smell like
Is the most Inflammable of any Body will burn on
top of Water itself 5th no other substance will do
Exp. Camphor setting fire when put on W. Barrel

An Instance of Heat & Spen Oil have shewn in a
Pelot Thermometer 5th 3 D of Jamaica Pepper & Cotton
of Water but don't succeed so well here as in a Common Still
W. should have a low Head and All is heavy

(a) 608 Whether an essential oil can be distilled from wine dregs is uncertain.

(a)

Lect. 49th. On Empyreumatic Oils —

The Essen. Oil getting made of Plants from Empyreuma
principally forms part of the Common

The much Cry'd Royal Cat ~~is this Essen. Oil~~ was
deposited in Parts & is soluble in Alcohol ~~[illegible]~~ (a).
Oil of Castor &c is of this kind

Vanilla gets its fragrancy retained Smell & Taste like
or Almond but none of its other Properties.

Often adulterated as we said yesterday, but however
adulteration in other Essent. Oils not of much consequence for
Medicine purposes. but for Perfumes in Pomanders more
volatile ~~[illegible]~~ Oil of Rose Water is retain'd in.

With Alkalies as we said make Soap but not diff. from
Common & return no properties of Essent. Oils

Wax is a substance which seems to have neither good nor ill
properties of Essent. & Expressed Oil; is made by Bees
Bees with the wax from Marine officers. Deposited
it in Cells with the wax from her own Body.

It is purified by Steaming & Bleaching

It is said Wax is so an a consid. but not that
of boiling Water is the difficult decomposed by Heat
but an Oil has been got from it by distillation it does
not differ from Essent. & Expressed in general —

Both Essen. & Expressed Oils from each other
but Both need an Oil which is called Empyreumatic
which differs from them in properties
Empyreumatic Oil have properties differing from
others. It is not got Native anywhere but by Distill.
It is a Quest. whether this Pure Empyreum. does not
enter as an Element into Expressed & Essential, or is a partic.
Combination which takes place. The first is most probable

If Animal or Veg. Substances are distilled we get a considerable Quantity of a Empyr. but they contain Spirit & Phlegm. One might desire to be got from these yet it is not essential to these Oils but may be got in diff. ways as from Juice of Veg. & Animals

Oils made from Fruits they separate sort & Perf. by setting fire to it on one End. This is call'd Jet & is most Volatile Oil is force'd off by Fire yet Pitch

This Empyr. cum. Oil contains a considerable quantity of Acid which should be wash'd from it before we use it in Medicine

In coming over Dist. from Animal Substances they bring a Volatile Alkali with them from Vegetable bring an Acid hence their Smells very Diff.

They differ in Qty are Diffill'd from Oils, or Solid Parts of Substances from Fluids Fluids are consider'd thinner, they also rather latter from Fluids are as thick as from Solids.

They themselves come over in two ways a thicker & thinner as a thinner comes over first in Dist. as they substance this may be accounted for from heat as have just said of thinner coming from

To get an Oil thinner we may have it on a Solid Substance as Clay or Brick & then Dist. as Oil of Vitriol.

But may get a thinner by Repeated Dist. by making it ferment to a Soap 15 Days Time & then may be got pure by separating this Dist. Oil & Oil of Soap is to be Oil Dist. thus distill three or four times in Water alone & Oil will be got clear of an Empyreuma & there then remains a black bottom of Stick tar Oil is tasteless & not Volatile used in Watches. The Empyr. Oil always soluble in Alcohol & Spirit differs not from Oil of Vegetable substance

Oil

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(a) It is worth trying whether the Petrolatum Lead intersperse-
-ally & uniuriate wd not when ~~united~~ wth this Sphine oil
make a substanced like Amber.

Tho it has had Diff Names as of Animals &c

We know little of the Properties of this Diff Kind of a
Liquor & to make Experts. We only know the Properties
as are here mention'd as Approved by Pract. Oils
recommended as an Antispasmodic. But what Effects
any Bodies as Acid or Alkalies &c do we know not.
This part of Chem Hist is very all perfect.

Lastly for the Oils we cast from Animal & Vegetable
Substances are only 3 viz. press'd Expr & Empyreumatic
Indeed Chem Chapes all oils mean Empyreumatic.

But none of these Oils are so from a hostile change
in Nature. Indeed the Oil of Petroleum
is an Acid in Amber. It Clay &c in many
in the Coal. Bitumen when got from any other this when
pure in Properties it seems the various Names have been
given to it when got from these Diff Substances

As a Proof that these Substances contain the same Oil
turned a Bitumen in Italy & in no Well Oil would to form
a Deep also then as Naphtha below this thicker Petroleum
below that Bitumen after that gas & fluid volatile out but is found
in Stone Coal. Here we have found to called Earthy Substances yet we
have found to Acid gas in Amber. It is proper if the Oil
changes of Properties of Acid as this Acid is got only from
Amber, probably by combining of Vitriolic or Sulphur Oil
Acid. It seems Substance may be generated the Acid being
changed into Oil of Amber
The Oil Succin distilled formed in different Works

This Oil is often adulterated to hence it pure will dissolve it
often. & this is done by simply putting it into a Bag or Receiver
& then setting it to boil in a Sand Heat it rises easily & clarifies
this not to lead composed as it Spirit Expressed. Get by Fire
Distill &c & so on Im Yourpa it often ~~[illegible]~~
the smell not to lead is English ~~[illegible]~~ Very often Distill & it is got
so volatile that we can distill it in Water to wash off Impur

614)

The difference then when we get them from the Spirit & Species of Thompsonum? In Distille a Known Substance is left behind behind.

It has a particular smell & taste differs from the Vegetable ones hence we may distinguish in Distilled & Substance in Anim & Fossile the Vegetable are Essential Oil. but the Fossile this Oil is differed considerably.

It may be repeated Distillation hence made sopure as to be perfectly Insipid & then is lighter than water & also not so hot most heat when impure.

Applied to Other Subtances is soluble in Salt. & Nitrous Acid & Vitriolic makes a gelatinous & other Oil did with the Nitrous Acid is joined with a Magnesium and then Oil by the fumes of Acid. But the Coagulum is very divided & have now found that mixed with the Spirit Oil taken so that the Impure mixture of Nitrous Acid is not coagulated but is mixed fluid.

Fixed Alcali have been made with Vegetable Oils we know in General that Oils are generally by the Acid Nitrous of Water but if the Acid concentrated then quite soluble in water, yet Alkalies & Acid unless it makes Oil are soluble.

All these Substances are allied Oils with the Vitriolic Acid distilled yield a bol Vitr Acid.

All the Fossile Oils are soluble in Alkalies making a Soap with Caustic ones making a Soap like the other Oils with Sulphur make a paste Bell and Sulphurous

Soluble in Alcohol but in small q^ty a drop or two to an ℔ but more the oftener they have been distilled.

Their effects on Metals & Earths have not been made with Metals they have this particularity that they don't use the Expressed Oils of Animals in red Calces of Metals & other Metalliform.

They can't be mixed perfectly with any Earths Lapis Gem Alum but with Fresh Lime. We can find em mixed with

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Clayse in Pitcoal. but this is not a solution only a mixture

This much for all the Chemical Oils which are found in where the remains have been burnt as Oil of Alcohol. Here Alcohol we shall speak of first as Other Essences of from it.

Oils is probable don't differ specifically but only by the addition of other substances but Empyreumatic is salt from all except the Fossile which differs from the other considerably in general.

These Oils are found sometimes thicker & sometimes thinner we see the Acids did make some thicker than others hence the Chemists have said Oils ought differ in their thickness according to the Acid that contains each this is [illegible] with Acid is not so as some of the Oils are made thinner. as Camphor & pure to Essence & Oil is thrown into the Mild Acid is deposed & made fluid & warm and Fat.

Earths as well as Acids, and Alkaline ones make Oils solid & contrary therefore we may say an Alkali adheres to them in which their solidity is owing. and we may as well say that the solidity of Alkalies are owing to Acids because Acids when united with Alkalies make them solid as in to Neutral Salts.

Chap. III. On the Medical Properties of the Oils.

The Oils differ in their Chemical so also they differ in their Medical Properties but each Genus from some another in their Medical Properties but each Genus has its other Medical same Properties.

The Expressed don't differ from each other except in other matter in their Genus as Essential Oils which contain for instance a Medicine that gives them their particular smell &c they is use distinguish them from another.

This effects wch are of other Oils but not so much as Nutsem, Mucilage
& Vegetable Power the last they seem to have little effect upon
upon the Stomach & have considerable effect upon much used
by the Ancients & some people Bath much in vapours of Mucus
they therefore used it to prevent the Skin's shrivelling
Likewise useful for relax: any contract: Part: & also defend
the Skin from all Acrimony. Upon these lee are used in
bad cases

In Inflam: wch the Skin is stretched beyond its Natural
Extent we have used Oil for relaxing it Also Ol: of Anet used
Oil most but we don't at pure said to obstruct the Tubes
don't yet don't relax so much as Foment: or Poultices
But they have this good Eff: that the relaxation produced
by them is more lasting than that of Water Mucilage & Glue &
Similar parts. Vid: is composed of Oil & Water

Water is a good relaxer but Oil should be used if it
in our Poultices because of Water evaporating is using parts less
become more dry than before so we add the Oil
Perhaps the Anet used Oil in Inflam: ~~and oil~~ for good
purpose we use do Foment: of Water &c

They are used also in Wounds & some ways in Ulcers
of Skin taken off & Shrivelled Skin after blisters & burns
The Expressed Oils have been often used together in
Ulcers & Wounds of soft Mends. Mr Quest: whether they
be used but this certain they are sometimes useful
& because of Plant in Ceremony of Ind: Magister Dispensatorius
or defended part from the ~~Cold~~ Ceremonious Labor crowding
of Neighbouring part but should not be used when the
Bone is bare they entering the Bone by Cavity & Narrow
Spread use Caries

They by their Mucilaginous quality Quicken the Growth of
Flesh Olives much used they make the Granulations
more Vivacious called Dungus.

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the Ulcers but forme shan't degenerate too here) promote
Granulations & obtund Acrimony. But we seldom
use them here as Washes, & the Bark, Aqua Calis, Ung.
Burgens, and Suppurating Process. fast Lent used Ferm
Cals for these Purposes.

But Ointments should not be used when the part supp.
wates well & Granulations rise and Pus is well
tied properly of ye Cells & being a Cellular substance
by & Common called contained within this Resp. tube the Ulcer
but promoting & Dressings
But Ointments should never be used when a part
is to be cicatrized as they too much relax & Weed them

Neither is it indifferent what Ointments we use for these
purposes tho' Spent Oil as Gum Elemi Ung. & Basil

Precipitate often ground in Ointments is improper
as the Oil does not dissolve it nor permit it to be
dissolved in the Pus. The Precipitate in ulcers should
be used alone & soon brings on a good Suppuration
which the Ointment seldom has any good Effects

We often have troublesome compl.ts of Inveterate
Ulcers, formed Lipo & by the Leprosy Coldly
w.th of Nose Palms &c. & these produced. Purkinson
& Spontaneous & Expressed obscure these concepts

Internally they may be given where Acrimony
is to be obtunded or prevented w.ch they are very good
It is not because our Blood is more Acrimonious but
the parts more irritable. Tis in Stone in the Bladder
from Ulcers is produced by ye Urine & deep Colour
because the Ulcer is very sensible & soon irritated tho' not because the
Urine is acrimonious
also if a Parts inflamed & becomes very sensible
as we see in Glands & Prominent those Minutes will at
these times irritate in some to gives Pain &

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(ye) Land was unsuccessfull to the Citizens, many Cases and Disorders in Edinburgh

Lapis Pil bels heavenly Lettice Effects when applied to the Stomach Except indeed as Cordials by producing Nausea but have no Diuretic Quality Pineapple Juice —

But in Fluxes & Torsions of Intestines Tribe often given & Success proved some Reason as given rise to Internal Stones they defend them from the Stimulus of Fluxes & causing Dysentery & Glandes & becoming more readable but of matter not more Acrid than in Health as in a beginning Diarrhea we are not troubled with Gripes & but when much Pain Bitters Secretion & washes offend Natural Juices hence the Dysenteries have been cured by Vitis Antim Wash Crat Dr Rutherford says the Cortex is prevented from being dissolved in Stomach by means of Wax, hence he wills use a mixture of Cretaceous Crata. tho Antimony has good Effects Calcine Diaphoretics

Have been used in this way to guard the Stomach from such Indigestions as produce an Inflam. & there as Coffee Lemon Juice or other Poisons are given to Vomit

Being mixed with the Bile & the Lap: Bels are dissolved into a kind of Soup, in the way the enter into Blood Vessels but can have no Effect on the Blood neither and Blood Vessels ever produced or are they at all capable of a Chemical Stimulus let the Blood be ever so acrid. Yet indeed the parts near the Vessels being irritated will communicate their stimulus to the Vessels. Nor indeed is the B. ever more Acrid at one time than another. When Urine is retained & all the Salts kept in it is accounted possible since other Secretions that any bad Effects proceed from

not so much from the Ceremony as the Putrefact. Indeed
Dr Cullum had two Cases where the Urine not being secreted
by the Kidneys is Nearly Sulphurous generated in the Body
had no Just pain in the Hypogastrick Region, but
Vessels were eroded, but a Putrid Fever carried them off
. They can't be given to Blind Persons, and to those
Vessels therefore yet they can be secreted by art. These
Secretory Urine in Internal Uses as in Calculi
Pulmonicus as Pulverulo, also in Ulceration of the
Bladder from Stone or in the Vagina where the Pus
is washed off by Dilutor Albus or Cutaneous or any
other Cider Urine being readily separated by the Urinary
Glands. Also in Cider Urine from Ven Descard the
Mountagenous Cures are given, but not internally, but
by injections especially found in Mercury. They
soon lessen Inflammation but in Ent Mixed in Oil is
best for that purpose.

Where the Pus is washed off from any of the
Inner Glands, as Stone or Gravel Urine
Oils the Sperm Cet & Ol Amygd. are most grateful
to the Stomach in Morbi Cophi, Ictus & Lear & others —

The Open applied to the Parts have no
effect almost diff from Vapour but the Hydrost
Vacuum Stimulus. The Peach supposed to want the Prop-
erties of the Plants but all have nearly become Medic
Virtues not entirely some being more some less Phlegmatic some
more some less agreeable to the Stomach it seems to be good
to their taste. Some are better than others as from
the Aromatic Plants.

Ancients used extremely excessive Perfumes
and mixed in Ointments the heavy disagreeable smells as

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of in their beginning.

In those is Sulphur & Nitre Also Wd. Water
so is desagreable of taste.

Little used as stimuli to Skin and Kidneys and more
used Vol. Already have Effects in Whole System
Internally act merely as stimuli to Stomach hence
Smoke & except powder discagreableness have no
Antispasmodic & are only used in Spasms of Stomach
since from weakness & thus take off Spasms & Change
which is they cannot destroy. hence used & Purgative
Opium has some local Effects in these Cases
Spas. hence no Anti-Spasmodic Virtue except in these Cases
they have been given and others to keep up the
Strength but very frequently very Cons. used for these
Purposes Contain much of these Oils but no Stimulant
Medicines should be used in these Cases except such as
have an antispasmodic & which have hence not.
Neither should Spir. Vol. Alcohol alone as have no
Antispasmod. but only Stim. & Diaretics.
Oil Camphor as Spir. Oil is Antispasmodic & Stimulating yet is deductive to Nervous System therefore
depend the Circul.n hence long disputed whether it proves a
Stimul. or Prod. Camphor & Musk therefore
more proper in these Cases rather of Spir. Oil.
In Griping they are unsafe because it is difficult
to know whether they are due to Spasms or Inflam.n
the Pulse being low & quick in those diseases of the
Intestines. Yet the hardness may lay a distinguish
Danger be distinguished hence Gentlemen of Hospitals
should be careful of Purgatives thus let it be a rule
distinguish Diseases of Intestines Medicines & Nervous Diseases
Pressing generally quicken the Pulse & hard Pulse
yet when it Bodys are often happens. If pulse had two

distinguish'd proving soft just before they were passed off
Fever often happens in these cases, but Habeas may
prove a Person free. Lumbago, Sciatica, Colic, Pleurisy, Gout
when strong & in unison by Lightness & when accustom'd easily
Distinguish'd. Use so many Bottles of Pulsey. I know not to bleed or not.
And this always a sure Criterion to judge when these
Bills can be given, & should be drawn off & bled
cautiously in small Qty but should be carefully
probible to distinguish'd too as different from an old
Mortific.no melancholy almost.

These can never be introduced in blood Blood in any
Qty as little can be seen in blood Stomach lies deep allied
by the Juices, & are so volatile that they easily fly off by
Lungs & some some other acid & hence a
Diuretic Quality. in Sweat &c. they do indeed
communicate a particular Smell to the Urine yet do not
increase the Secretion, tis probable in any degree

Diff. Effects & Properties have been assigned
to these Bitter Roots, viz also to Sole
strengthen these Roots Embelish as Anise
Caraway seed Solec Bellocal to encrease & fecundating
mucus in Lungs but they can have little Effect there

These Roots Aromatics & Aromatics Remedies
have been used as Cordials & end of Scurvy
where was and they were improper. but often used in
bad Growth considerable juice & succeed. should not be
used much in these Hot Climates. People in warmer
Climates becoming Impatient bitter Thermometer, surely Nature
has provided in these Aromatics & Bitters Stomach,
being often relieved from Dry Food & soon fond to
these Climates but these Effects are not lasting &
should only be used when Flatulencies are upon Pat

The Labiated ones have been used as Gulas
from Rosemary Lavender & Cephalica from Hunts
& Nomicho & are very agreeable to stomach but
Infusions are better than the Oils & Nomicho & Depta
Water, & Lentgin & bit. which old Infusions cont. & other prae-
-ties & pecula & bid
The Gulated ones have been used as Antispasmodics
& Emenagogues, & last property it doubtfull
whether to no the cont.

Hence the Properties of all nearly similar
when from Vegetables in General

But those from Animals are Antispas: being
& Die nearly as Camphor & much Excellent & may
be used in preventing Spasms as in Epilepsies, while
these Ant. act only in just when & Spasms are upon
& Body or just before it begins hence useful in case on
otherwise. Are very useful med Kinds of Fevers
as Intermittents & Hemitritaeus & Tertian

The Imprimis Cir. of Animal. used & necessary
used in Edinburgh in Bad Epilepsies it was given to
lessened Fit & kept it off but gradually lessen & their
Effects however should not lay aside such remedies
as it is probable these & other & many others
might be used to cure Epilepsies & other Diseases
arising from Spasms as Hydrophobia &c & good success
but in none of these cases can they have any good effects
but old Inf. & other Spasms as tapping on the Throat
won't destroy the Irritability

Chap. 12 - On Sulphur

Having now finished the 1st Class of Inflam.ble except the Vol. Phlo. 3d come better under head of Bitumen.

The next Class comes under an substance called Sulphur or Sulph. Mineral it has been supposed by Chemists to be a Pure Element, being of Phlog. & they thought Pure Metals had no Sulphur.

We know of 2 kinds only.

Sulphur Mineral to distinguish from Mineral Sp. is said to be inflam.ble & Vinegrible in W. by d. I distinguish from Bits by d promotter substances & by d from other inflam.ble Bodies.

This native in d earthing quantities in all Earths either in Mass form or in its Comp. sometimes in a flakey form, dry green. assum. Regular. It found also combined in d. Sing Class Alk. mach Sep. Sulph. in this way is found in Mineral W. known by their smell like Rotten Eggs.

It is soluble and Volatile Tal Lutz. Down found comb. with Metals, but often mix. d it as in Corals to d have sometimes evident Strata. It comb. d other Metals mark. d Ores in d Perfect state Silver Lead Copp. Iron. W. d imperfect and frequently Arsenic Regul. of Antim. Cobalt & Bismuth in d Earths Bro. Sulphur Native in d Quantities, may be also made by Art. by Combin. d Vet Acid W. d Phlog. but only by this Partic. Manner by first making d Acid & then Alk. & then add. d Phlog. but we can not say this is a comp. of Phlog. & Vitriolic Acid merely as the Vet. d. Phlog. makes d Vet Vitr. Acid. therefore we can't say it is composed of d Mineral Acid or of d principles

of ye Vitriolic Acid.

Therefore tho' we know this Compound yet we must treat of it as an Item as we know it compound exactly

It is separated from ye Ore by Sublimation generally comes out in ye form of Yellow Sulph^r or Sulph^r Vivum is then purified by ye Bleed it is Cast in large works & ye Flowers are afterwards melted down into Roll Sulph^r both generally Pure it not being worth while to adulterate it. Impurity may be judged of by its burning yellow & leaving many fixed ashes & less its assign of impurity.

Brimstone want ye for a Partic^r Perfume a second Subst^n do ye Business

It assisted by heat melts at a little & heat more than Boiling Wat^r yet not a red Heat 90^n fluid takes up a deal of Room, hence in ye Roll Sulph^r we generally see a Yellow Film over ye small Crystals.

It easily tendered fluid & Steam very Volatile.

Its Specific Grav^y is as 15 or 16 to 10. Stoll Patent

It not to be decomposed but by Inflam^n as ye Acid & Sph^n have ye greatest of Att^n nor can we do it but by Att^n without Inflam^n: ye Acid comes over ye some part after is sometimes got in a Volatile form, but Generally in a fixed ye Comm^n Vit^c Acid —

There is still two ways of decom^g ye Acid. 1st By Heat^g it into a Vap^r Sulph^r & then Exposing it to ye Air. Secondly By Exposing it to ye Air by ye Sulphur is decomposed & an Acid generated. As Sulph^r contains much ye Acid there fore we should search for ye Acid here.

Applied to Other Substances. —

It not soluble in any of ye Acids tho' ye most concentrated. Only ye Vitr Acid poured upon it & exposed to ye Air & then ye Sph^r of Acid is generated. Hence ye Method of obtaining ye Acid in Pyrites & Sulph^r is decomposed & yields ye Acid. Iron into Vitr of Iron, or ye Copp into Vitr of Copp

Solvent	Means of Solut.	Resulto	New Subst.ce
Sulphur. – Alkalies fixed	. . .	Hepar Sulph.	
Vol Alk. Caust.ca	by Distillation. – Alk. Caustic by add.d Lime.	Vol Hep Sulph	
. . Mild	. no Effect –		
Neutral Salts	no Effect		
Oily Subst.ces	by Heat. –	Balsams	
Alcohol	no Effect		
Metallic Lab.s	Heat.	~~Hepar~~ Sulph.s Metallorum.	
of Silver.	Lead Copper,	Iron —	
Semimetals –	by Sublim.n		can be united w.th Mercury Antim.y Arsenic Cob.t Bism.th union resembl.s Ores
Gold Iron Tin Platina	no Effect		
Calc.s Earth	if Caustic by burned or dry Sol.n	a Hepar	
Clay	no Effect		

Hep

It easily soluble in Acids & Alkalies into Hepar Sulph
may be deprived of its Acid Alk & Calc by adding
a solut^n of Borax but more easily by melting
& Sulph & then add it to Alkali

It soluble by Distill^n in Vol Alk into a Volatile
Sulph (as it other wise fixed by adding Lime) but Sal
Amm. & Vol Hepar Sulph comes over more volatile
& penetrat than Otherwise

It not to be united wth mild Vol Alk. probably
because it is enough it can be applied in Dry Solut
not promote a trading more in this.

It has no Eff^t on Nitr Salts. –

It soluble in acid but not dissolved Bals of Sulph is
easily united to it in a burned solut^n by putting into it
& applying a considerable N^t. a boiling it will expand to fixed
& be dissolved & expelled at least in any Quantity.

It not soluble in Alcohol.

Dissolves most of the Metals called Hepars of Metals.
Easily this may dissolve Iron lead copper Iron by heating
the metal & applying the metals or else fusing the metals
together. If they apply the metal Hot to Sulph: it dissolves
in stratis lead. the metal and middle stance.
these properties come near lead Argo. in its medical properties
In the semimetals. By Sublim^n it cannot be fixed
united to Mercury. Arsenic Reg of Antim (but Antim
these resemble it bres & have same properties
Will unite only wth a Cert^n Qty of the metals but it
least Qty of a metal may be dissolved in ever so great
a com of Sulph:
The metals it does not dissolve are Gold & Tin
The semimetals are Zink & Platina hence we can
seperate the metals from any other by melting
in & then adding Sulph^r wth dissolves the others, & leave fixed

Solvend	Means of Solⁿ	Result	New Subs
Hepar Sulph. Fix.			
Acids	addition	Sulphⁿ is precip.	Neutral Salt
Metals Semimetals	Heat-deposits	Hepar Metallⁿ	
Hepar Sulp Volat			
Silver & Lead	In solutⁿ	Sympathetic Inks	
Mercury	Wet Solution	a Cinnabar pl for A Precip	
Oils Ess	unites in any qu.		
Essen	unites w a large q only q Oil		
Fossil	unites Bal Sulp Barbadense		
Empyr	know not		

A deposite Calcd Earth when Coiuset Leaches in Burned or
by Solut^n made of Hep^r Sulph^r and Other Earths
or Clay Vetriolus no Effect as to Precip. & Earth of Allum
Tho Lucy letter by Q.

We have now run to mention the Other

Hard tests Comp^d of Alkalies and Hepars
The Hepars of Fixed Alk don't differ much
The Hepar is not volatile and Sulphur is easily exposed to H^t and compos^d takes place by Sulph^r Phlogiston of Flew ing Gleed Alk. in a Vitriol of Florles.

Acids are attracted by Alkalies more than Sulph^r hence in precipitate it from solut^n of Hepar by Gleed.
to make it hold or keep is left of Sulphur in this way we can get perfectly free it from seperated from Metals but not otherwise and Hepar deposites all of Metals even Gold Tin Platina Fe if Sulphur be off does not deposite
Hence often have Metal in a Precip^t safe from any other Metals but we know not new Precipt.
For instance Antimonial deposites of Sulph Antimony some Metal antim^y hence if add to Antim^y makes a Hepar of Antim^y which alter of Regulus Precipt^d after Precip^g of Sulph Aur Antim^y this is an ancient^n medicine and by Reg cont^d cant be determin^d.
If to this Hep^r Sulph or Sulph Aur Alcohol is poured distilled Vrine of Regulus metal and Dried Antim but this is an ancient^n Med form some reason of Effects of.
The Hepar may be made by Calcining Fixed Insipide by Stir a great Deal of any of Neutral Salts with Vitriolic Acid. in this way we may convert all Acid into Sulphur but what is remarkable if a Gl Alk is applied Old Acid then admitted in open Vessels will remain to Neutral Salts & Sulphur being dissipated.

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there is partly doubt w^d seem that sometimes ~~one~~ & sometimes another substance acted agreeable Alk^n to Effervescence but it seems to be by & over dissolved Philos^r.

This Hepar dissolves the metals gravable by humid but immediately by dry solution mediate & partly metallic salts have said to have partly effects but not by at much tried but their effects & effects from metallic salts made by Alk. or Neutral salts.

No wonder ~~Corrosive Sublimate Hepar Sulphuris~~ but is made by fixed mineral Alk. Caustic. It is so volatile that if Preparat^n left open in a room where there is lace its colour will be changed hence the ground of a sympathetic Ink. as the Solut^n of silver or lead. & reason is the metals attract Sulph^r stronger than Vol Alkali & so hence a partly way of forming of metallic Sulph^r.

Sal Mercury & this Vol Hepar added to it untie after stirred some time into mortar and in this way we get a very fine Powder of Mercury &c. &c. like use perhaps in Cutaneous Infections. In this way one of its Elements is decomposed by the Metals & another & spirit & fixed Hepar.

The last Corrosive is w^d & bils w^h all of the is capable of & united but under in different ways.

1st the & Expressed Oil under w^h is called of & Oil a very pleasant 2d & Essen^l is only soluble in cordial & more easily in Heat. ~~& Inflammable in smelling~~ & Essential Oil upon stand.

3d & Fixed is soluble in any & making of Balsam Sulph^r Aerpidence. of Thop^r

The Impression^s Oil is seldom pure therefore often never indeed. This Oil hence know nothing of this Balsam Sulph^r

These Solutions in & Alkalies & Oil have different Medical Properties from and Sulph^r to effect back of these we shall speak when on Alcohol. & morrow then & Fermentations Saccharine & Vinous.

Fermentation is an Spontaneous process of changing of Bodies by an intestine motion by wch a new combination of Elements is brought about and this without any addition except such some extraneous in this Intestine motion

Sometimes there is a separation of some of the first or old Elements wch are thrown out as in Lees.

This process is quite a natural one & all we can do is to set the Subjects into proper circumstances.

a certain degree of heat is necessary for all Fermentations & diffr. from the regular other diffr. circumstances.

The saccharine fermentation should be the only one of our present enquiry, as the other fermentations depend upon it, as fruit & Vinegar wch cannot take place without it, then Acetous & Putrefactive but this does not depend upon the Acetous absolutely, as Sugar may be made to putrefy without going thro' the Vinous or Acetous (at least as far as we can perceive) by applying great heat to a solution of Sugar

Sugar is formed from a Watery Juice of Plants or such solid parts of them as are soluble in Water.

When Plants are just going to shoot, the whole of their Juices are then converted into Sugar. Some Vegetables contain more Sugar than others the Numerous Bottoms heads most.

Allow candolo opinion this fermentation is to be in Vegetation improper circumstances

Vegetation therefore necessary for the obtaining of Sugar

The greatest quantity of Sugar is got from the Sugar Cane from the Juices expressed & Water spent evaporated & Sugar remains. But this Sugar containing much Dark ness in prevents its Crystallizing, wherefore we throw in Lime or Lime Water to dephlegm & Mucilage then gives it a scum & on surface. The Molasses are hardly fermenting & only Sugar. Mucilage to dephlegm & Water & Clay, is most thrown on the Sugar & attracts & retaining Mucus, hence the whole

Sect. 43 On the saccharine Vinous fermentation

The 3 kinds of fermentation is Alcohol last before we
speak of it we must take notice of Sugar and the
is made

Sugar we never found naturally
Sugar Alcoholous produced from fermentation
substances by a Vinous process called fermentation from
obtuse or any other Ferment through all the vegetable
bodies in great & other Ferments & Sugar added
It is a change of the Whole Body without addition
or at least without any to begin the Intestine Motion
By the motion the whole of Body is changed into a substance
different from it was before

Thus Sugar is produced but by heat after it is changed
by an intestine motion into a substance similar to alcohol
no Vine or Alcohol it is altogether in its properties different from
the Sugar.

We can't set a substance in ferment but by such a
circumstance as heat for ferment destroy the ferment
Thus the juices of plants can't be converted into sugar
because not in the perfected plants or else of perfected. nor
can we convert a blood into Bile without Vessels or other
Ferment. Yeast is other Ferment for this purpose must
be fluid or dissolved in a fluid or dissolved in fluid. So for
instance mix Meal & water mix body

We come now to the Vinous fermentation of Saccharine Vinous
or Intoxicating

Wine absolutely depend on a certain fermentation produced on juice of plants. The Vinous can't be produced
but from the Saccharine nor Saccharine but from another

of clayd Sugar, as it is from Brazil.

It is made still purer by repeated solutions & crystallizations and whilst evaporating in order for ch.n they throw on a white of Eggs or Animal Serum or other Coagulable Juices, together w.th Lime Water, wch incorporates the Dregs & Smoke wch rise to the Top. It is then thrown into Moulds & when cool is formed into small Crystals, but may be made large even as Sugar Candy.

Another way of getting Sugar is from the Seeds of Plants wch always consist of the Embryo of a Plant take produced & the farinaceous substance, & in the Circumstances of Heat & Water is applied the Plant germinates & the farinaceous part is converted into Sugar. This may a deal of Sugar is made as in Malting but not for the sake of Sugar itself.

Malting is the soaking of Seeds in Water then laid them out in heaps in a place warm enough to carry on Vegetation or Germn.) They must be stirred pretty thin as: Air is always necessary for this Fermentn. (for Seed if long deep in the Ground will not vegitate

As this Fermentation always produces a considerable heat the Seed must be turned frequently, to prevent it as also the Vegetations going on to a Past wch hurts easily does, as it is remarkable that all Plants Vegetate upwards, & if turned cant go in like the Plant takes a turn & points upwd again. make a crooked Plant.

The Radical begins to shoot at one end of the Seed grows thro the whole length, & comes out below the Husk & farinaceous part. As far as the Radicle goes the Fermn goes on converting the farinaceous part into Sugar wch nourishes the Plant to then contains the Sugar. As soon as the Vegn is gone on this length the Fermn is to be stopt by drying the Barley wch keeps the Sugar.

The Greeting now practiced is not enough Radicle tops thro above half of the Seed to prevent any part of the Sugar being destroyed and by this means Alcohol will be got (or lost) than if the Vegetn of the Radicle was perfectly completed.

Sugar is made also in the Vegetation of Roots biennial annual Plants.

But the fermentation Ferm^n takes place only after the Acetous Ferm^n in general, & Lemon Juice & certain kind of Vegetable Juice except some. Yet in some Plants the Ferm^n so soon succeeds each other as makes no choice of Cabbage for instance will putrid followed the Vin^g. quite putrid in a few days become

Tho' Vinegar depends upon Fermentation & Distillation and Vinegar, yet they may take place in the Juice of Sugar into Wines & Vin^g. As in our Cheese no Acetous Ferm^n can take place before converted into Blood.

Chem: is found formed below Dews after sun set on Sweet Grass and Sedge. His opin^n of Mucilaginous & other Ferm^n I think he said does only change into Saccharine Juice Sweet as Sycamore &c for instance when they stand to long are not distilled into Wine for improper form Nour^ms of Plants. hence probable Sugar is formed from Water only or very simple Food.

Water said therefore to be an Vegetable formed from Water alone & Animals from Vegetables. Yet we should rather imagine it to be compounded from these Reasons —

As Ferm^n is first carried on by air & Fire & Water and this is maintained if this should take place at a hasty time of Year & not in another time of year Warmth.

Brandy be often raised by applying Heat & Moisture in Sycamore Tree but in most other vegetable Juices Wine is only a hasty time in general Vinegar will soon be the Spring.

Sudden vegetation generally made formed since Frost from the Sun Vapor & Heat time in Mother & Chemistry probably by destroying Mucus. Yet Dew in the time the Vapor is continued then thrown into Atmosphere & those Drops

The Sycamore Tree contains a good deal of Sugar.

Sugar is likewise formed in y Flowers of Plants where a part or Receptacle is set aside for making y Sugar (a) just as y Flower opens. This part of y Flr is called a Nectarium when y Sugar remains no longer, then y Female part is impregnated, at wh time y farinaceous part is scattered.

Honey is a true Sugar & may be also Crystallized. It is collected by Bees from Plants & is wholly Sugar.

Hence arises that y Sugar of Fruits & Apples &c. is more secreted from y Fruit to y Cells of y Fruit & hence it is notorious for y on-taking y fruit to mend Juice, it will be a superfluous Sugar be formed unless y Acid be too strong to undergo that Ferm.

(a) It is probably placed in flowers to be collected by the Bees & other small Animals, wh at y same time scatter y Male to Female parts when y Seed is to be fecundated.

too much time was not lost in the prosecuting of this
Distill from a Liquor, particularly the Liquor of Common Barron
Sugar. This Process of Regulable Fermentation of Vegetables
is added to clarify it by bringing the Fine Lucenous particles
thereof to ferment & then found into Mould & Cay
brown upon it by attracting moisture. Other Plants
contain considerable Portions of Saccharine Juices and Syrups
as Grapes, Cabbages &c.

The Second Way in which the Saccharine Fermentable Juices
and Seeds of Plants do Connate and

Seeds in general but not always must be thrown into the Earth
but not always during Months as in Malt Liquors

The Saccharine Fermentable may be carried on in edge of the between
Fences Point & Heat of the Human Body, more in Ingestured and
but that is generally by a Ferment Process

The Third way in Carried on is and Tobacco of Plants
Juices form & old Farina of Seeds in this Sugar or Honey
& is collected by Bees & other mixed in Fine Lucenous
Vegetable Gums & Resins & forced & carried
for Sugar

The 4th way in carried on is and perfectly forgotten.

There is still another way in which Sugar is formed in Nature
Vegetable & Animals contain the Principle of Animals whether they feed
on Animal or Vegetable food, hence it should seem that
it is necessary for the Growth of Animals as well as Vegetables
this Sugar to be consumed by a Young Animal & into
greater Growth & Bulk.

But this not so necessary for Animal Growth as Chyle
Growth, Young feed on Milk of the Egg.

(a) Sugar is poisonous to all Vegetation and it is also probable that it is Virgin's is not nourishment of Animals, as it is observed that ye Young of all Animals love sugary things whilst growing. Hence Young Animals eat ye Youngest Plants &c. & is also always in ye formation of Flowers or gives short any new substance

In Fermentn Sugar thus formed, & separated from some Vegetable & in Water & exposed to Heat not below 40 nor above 75 degrees is subjected to another Fermn viz the Vinous. wch can only take place where Sugar has been formed, for no Wine can be made of sour Grapes. the same Juice once put amongst the ripe sugar already formed at the Sech. Fermn agoing & Ferment Vin.

The Grape is thang on ye Tree till fully ripe, and the Sweetest Grape always makes ye sweetest Wine. then the are to be bruised, & Juice is to be let run out without pressure, that ye Kernel Oil may be left & no bitter wine gave it a flavour

(a) 148 attract above 100 wd make it putrify, and between 75 & 100 change it into Vinegar as fast as one part had undergone ye Sun Fermn.

Sugar may not ferment with other Substances by the Help of Lard & Butter which is done by the Gall Bladders of Animals. Sugar may not ferment by (a)

Nor does it seem that it is necessary that a ferm.n should begin in the Lees beginning Anew of itself.

This Sug.r not perfectly purified contains other fermentable Stuff. Refined Sugar should in the Process have been about 65 or 75 Degrees Farenheit undergone another change into Wine, which has got several Names acord to the Substances from which it is made.

Sugar Beet Juice. By Tartar is made from Milk. Whey may be made into Wine but this is not practised in England. By Tartar have

Under the Vin.o Ferm.n may be placed Sugar not Refined which is considerable 25 Gall.s but this admits a certain Latitude. Wines differ in their Strength being made from Sweeter Grapes is made Stronger.

The Sr

Wines can't be made out of Continent but only in Poland and Cyprus. Heat often rises above 95 Degrees in the Vin.o Ferm.n and Salt Peter

Sugar whether Sep.d not from Juice of Bl.s if proper circumstances are applyd is also capable of the Vin.o Ferm.n

If the Sugar after Sep.n is used, in order for Ferm.n it must be diluted, this only in a certain Proportion viz. of Sugar to a Gallon of Water is two delute in regard quantities of each if be too much sugar therefore between Di & Ri, if too dry or too ferm.n may take place yet very slowly and contrary if too delute it will run on so fast that Acetous will soon succeed Vin.o Some substances as Whey, The Juice of Sycamore require evaporation before they are fit for this Ferm.n

650 (a) and we know if the Air of a Subterraneous Lucem is proper or not for Respiration of life, by exposing a lighted Candle to it, if not it would burn —

*(b) This is so exceeding small that we can't perceive its in Bubbles but is one to this Sep.ⁿ

Lect. 4th.

Appearances and Pr. Terms

Air & liquor expanded or lost air sep. by Ferm.n (6)
proves ~~Lean~~ in dry Cordes. But this air ~~and~~ Ferm.n goes
out & up in large qu.ties. In rid brings up particles
wine ferm.d into a mucilag. substance called by flowers
or in Beer Yeast. This only a qty of air envelopped in
mucilag.n particles as also Particles sand or foreign things of
that nature are involved mixt also. There fore
are of greater specific Gr. than rid. solut.n & they are dough
or stiff not but involved rejected air sep. & rises
but by air being sep.d & rest falls into Lees.

From d Fermn. greater a Sep.n arises w.th is called
Gas & Salvatile, probability a Sep.n made in air. After d
by cold one ferm.n of this air shall ascend in a vessel
above d liquor & dry will absorbe it again.
We know little of d properties of this Gas, nor can
condense it to make Sep.n. But we know that its not fit for
respiration or d inflam.n & life of bodies. The same fact has
stenes & drains effect on both. Yet it is proper food one is also
food & any animal. Lastly this air in ferm.n is called in this Gas
The rid & d thickness is continued diff. times in diff. substances
due bid bread is called d Cellular ferm.n &c. during d
rising of Gas flowers & fall of d Lees &c.

All & Ven.s dry or all solut.s of sugar are not equally
fit for ferm.n, they of Malt. & rye are something lower
of ferm.n going to a Inpus.n of Malt wort ferment, without the
perhaps owing to mucilaginous Parts abound in it in particular
hordeo sugar ferment unless in weak solut.n. The substan
ce necessary to begin d ferm.n is that w.ch hard ferm.n of most
actual rid flowers or yeast. —

Belief of Wine was stopped in its Fermn. Vinegar obscure Fermn. destroyed the Lees wanting Vapid this wont take place.

The Alcohol in the Fermn. is destroyed not Evaporated the Air should have free access yet not too strong a Stream and so rid Alcohol

The Alcohol seems to commit a Fire and Oil with Acetous Acid & Salt seems neutral

Many Alcohol may be made with other Fermn. from the Radix Vegetable and Leaf & found in Greed & Leaf nor have seen the Spirits of Alcohol thus got but Mary Author says no Bottles notwithstanding.

The Acetous Fermn. contained much more greater Qty of whole being changed into Vinegar and that is run into a Putrid Fermn. yet Bubbles again arising & Leaf not Cut no more Acid but absolute Acetous, for the Acid Spirit Acid only & Pale Earth, & Brown into Earth Putrid Air is Leaving & thus Animal & Vegetable return to their Primitive State

In order that Acetous Fermn. may take place certain Circumstances are requisite. The Lees rise yet air bubbles are separated & whole becomes turbid. The Lees rise to the surface and Crust here is not full of Air Bubbles, this crust breaks & falls again in a sort of Lees

Free access of Air is necessary. & Heat must not rise above 112. If this Fermn. is continued Red Crystals form till the Liquor loses its acid Qty & whole is resolved into Vol Alk. Acid & Pale Earth

(a) the mean 70 to 75 Fahr

(52)

This ferm. goes on pretty or flowers allow long if of ye day was soon over if cold or longer time appear least diversity of term. When this Acetic term is finish'd the mucilage separates left of this fine & falls into laces as also dead mucilag particles is made of Lignum Pedunculus wore this is depend as separator such large of ye Gas Sylo. don't rise in so degree

When of Lig is new form'd it has a pecul. taste as lig. Alcohol or of Sylocobre.

Thus is sugar perfectly changed into another substance by Alcohol in Wine.

But this term is not perfect but as more or less accords to of promoter hindrances of term as either metal. Acid or many substances of hinder ferm as lead changed, Bu. stop of sight of digest part of sugar not perfect changed, Bubbly degree of weakness to remain by of term. they stop sourish & fermentency encreases.

In Especial ness encrease heat and term. can go on in but not be too hot as above 75 of sugar will often be burnt into vinegar if above 80 or 90 would be burnt grated. or not die disappear

If as soon as many of sugar is quant into Wine of heat is above 75 yields be turn'd into Vinegar as of sugar changed gradually into Wine —

The 2 Especial ness is access fresh Air.

The 3 Especial ness is access of fresh air. of pasles the more free, hence of flowers are to be taken off or else broke that they may sink down. but the admitto of air a certain Cellulose forisfied flowers are taken off of term. will be destroy'd

The next Especial is a Ces of the ferm. lies in large ess probably because one part ferm. of side of others of pursly encrease a little of it encreases in the degree of

Yet this don't seem fully to be good of effect of term of a large degree.

But to get 'em perfectly clean from all Oil & Fumes & give them subject 'em to the Chemick Process and Repeated Distillations alone doth do it.

And by this Method Alcalis Water drawn from Spts yet it likewise contains some Caustick Alkali in Spts insoluble in the Spts yet this has hitherto escaped the Chemists detection & then Oil can be from the Spts by Double Distillation & Alcohol comes over perfectly pure. The Alkali dissolved in the Water must not be put into the Retort with the Spts.

But this troublesome for instance in Shops the best way is to chuse 'em by the Specific Gravities & once we should get the Specific Grad of Alcohol & Water in any Combination to determine may be able in practice is to get the Bubbles of Different Weights or Specific Grad by which we can Examine Spts after had first made Spts by mixt & true pure Alcohol & Spts & by Rectified have Bubbles form in the Top of the Bubbles continue some time this called proof this only happens in Proof Spts contain ⅔ of Water & one ⅓ of Alcohol. If more Water no more Spts if Alcohol Spts mixt pure only proof.

These Spts are very Volatile but not Elastic of least of any substances. hence we can lutings safely & loose stopped Alcohol. The Lutes Clay & Sand & white of Eggs then Dry & Lime strewed upon the Egg & Egg

This will get Alcohol perfectly pure

The Wine left after Distill. will if applied be contain above 60 Gallons from 1124 another Refrig. & Lees will also Heat will undergo Air, Vinegar of Wine Spts Spirit One ariseth from Alcohol which is from the clean becomes turbid. The Lees cause in Fermentation lose a soft half hard Bladder. This Fermentation place of Wine & Fermentation have been perfect & a free Air is allowed this Fermentation Takes place

(459)

The Next is Agit.n or beat downd Bodies
mne of Less it & Lig.t. & this goes on Bore by stirring
w.th a stick then day shake & Vessels, the flowers
hangmore heat downly & perhaps.

The next appears is Dulce Solut.n of Sugars &c
a red of Circumstance of Term. goes on ye quicker
of weather tho ma return Solidified, for it boweth will not
Receive ye Principle Assimilate to Term.

Now the Tendencies are either ye Contrary by Repeat
or apply Bodies to stop it.

If it doe Lik.t it is cast: the Term. wont go on
ie less than 40 degrees & according Term. is begun & flowers it
goes on
The Less free Acess other ye less perfect Bodies
of Term. wont air no Term. will begin but after tho
stinger but slowly however & less Effect the Colour
The Repelle of Lis are to stop Term. as Acids
added stop it hence ye very Sours fruits tho they
cont.n much Sugar det ye Term. wont be carried on is
cam so will oro perfect. But this Malice Acid dont
stop etro much as those Acids of Mineral vegs Dare
incapable of Term. if ye Malice Acid is capable of ye may become
water by Dem.n
Fixed Mineral Acids & Rep.s of Vol Vels. Acid in
Sulphur & Vig Term. most. The way we can apply this
allure ye flowers or by Vol.s in Electricity It is well
known that ye Matter of Lightning is ye same and
Electric hence ye fall on any Term. Lig. stroke of
Term. owing but Vol Acid it contains
Electrify is burnt a Room where ye Lig is given
ye will stop ye Acid acid in a Volatile form influencing
The other way in wch we have Vitr. Acid in our
Chemical Vessel when ye Water is not added stop Term. ye
Chase.
How things nature can't say only it may such
a we don't know ye Effect ye Acid and this Intest Motion

from the Greater or less ds of sugar they give in
strength from each other & stronger & more sugar
& accordingly as the leaves them is more or less brisk

Their different briskness owing to the Ferm^n at that time
hence perhaps Wines are not always of same Champagne
is made almost alone time of fermentation kept in bottles brisk
as the Wines hurtful from the Geo of Alcohol in them

The Wine form^d just in wine is composed of
3 Substances Spirit Lees & Tartar. These 3
compounds are form^d by fermentation. The Tartar
is owing to the acidity of the Wine & more acid are
more Tartar is generally hence commonly Rhenish

The Clear Wine & Lees differ only in the Proportion
only Chemic^l Analysis will detect & name principles

It is found Alcohol weighs 1/6 Phlegm, etc
10 of Alcohol that the properties of Wine are every

To separate it from the Wine, we need only distill it
& greater ds will do it once a greater ds in proportion is
gained owing to the greater strength as also the improper
[illegible] and [illegible] that a Distill^d wine not fit for
Parliament having [illegible] Fan
[illegible]

The Alcohol then got is tinged with the Spirit of
the plant as in Barley, it is Brandy from Rice
Arrack from sugar Rum. These liquors
from wines cont^n nearly to one Spirit of Wine hence called
Brandy, Also. Rum are tinged with an Empyreumatic
from distill^g Distill^n a considerable ds of Water in
that they cont^n Spirit of Wine in combined state & is
wed upon pouring it off into lots & then is deposited
Lis or clouds & Distill^n

It is scarce possible to get an perfect clear from
it plant dist, yet nearly so by often rep^g these operations
Fine liquor

Sp. G. But

& all of Inflammable even Alcohol itself

All the bile, stop fermentation, wanting Lungs
It is evident now they, which when they cou the surface
they stopped further fermentation. But if a remedy
It is apprehended Subst. cont. fermentable would
prevent New Wines should be put into New casks
& stop fermentation & prevent the Acetous burst.

The very substances made from fermentation wanting
fermentation this is not peculiar to Alcohol alone Vinegar
does it if they are made pure from Mucilaginous
substances & they the products contain some probably
that fermentation is stopped by Alcohol as it is produced
it.

Another hindrance is of Viscidity of Juices.

Infusions of Bitter Herbs Simples it probably covers
lod herein in which Bitterness consists but don't stop
but prevents little wrinkling on more slowly Aloes & Opio
are approved upon that & opposed generally as very troublesome
Lastly an Alkali or Salt appears stopped fermentation
in Lungs & promoted hyperacidity only.
Now these not we know not.

The Wine will be more perfect in proportion to
Assistances or hindrances. the more with
The Sweeter & Wines, & less Vinegar & Ferment some or
they also are kept from into Acetous fermentation
acid & fermentation has been more perfect.

By these hindrances we are stopped from entirely
Alcohol & turns into a Selected mind of Malt instead
of wort Flavors or less & more immediately intoxicated
without undergoing a Acet fermentation.
But this by add fresh Ferment it will be cured & fermentation
required is fresh Sugar & of Juices of Plants Remedies are
& Death, & it Acetous does it.

The fermentation however often turns on too last fermentation
& to change into Vinegar but this may be stopped by
Fumes of Sulphur appl. lod. infusion of Gum

(a a a)

(aaa)

By fermentation we get rid of the w[illegible] which
assumes little acrid & disturbed in close
vessels. At this time all more obscure term[illegible] place
in bottles, & continues as long as it remains therein closed
& unopened.

Hence another difference of wines ~~[illegible]~~ effervescing
up go to a more or less degree this term. it is most
unchemical to regards, upon opening a bottle of Burgundy
or Champagne gives a brisk & lively gas & wine
making these wines so particularly intoxicating & not
so much so by Alcohol they contain.

There is some other particular in this obscure term[illegible]
[illegible] renewed in presence of yeast in w[illegible] the wines
is repeated & brought them old fermentation & grows more
strong from Barley wine & Malt wines mentioned that is yeast
in full stores & this power of fermentation in strong wine
bodies is still more totally accounted for that in Beer
in bodies. Hence the longer this obscure term[illegible]
is carried on the wines become more mellow & ripe
the more old Alcohol is destroyed the gas sylvestre is more
separated & the wine less intoxicating.

Hence the wines where the obscure fermentation more
slowly can be kept longer them those where it goes on more
briskly, & the weaker wines longer than any

The Difference of wine old & new & intoxicating they
are made from as wine from Grapes Cyder from apples
mead from Honey Beer from Malt & the Difference
in wine is owing to the different adherent substances
The difference in wine got from Grapes is owing to
also in Grapes there is an [illegible] communicates
to taste to the wine as in Port & other Portugal
wines.

Claret & particular flavour to wine smelled strongly
of the Claret Grape

Tract of Alkali Oil Ether & Oil Dulce

The Pure Alcohol wch was at length procured according is pretty pure spirit of Sp. Gr. & W. and is now not so pungent as when it was first Sp. Gr. & W. and both of it & the last remains a Lighter Alcohol, included in the Alkali & Spir. Oil, & tinged of a brownish Colour. The Procurers of it wch (Alkali) perhaps may be perfectly clear & free. Yet it but the Process insufficient to destroy & Dulcify Bromes & Sublime & was so late acknowledged same.

The Alcohol thus got is Elegant Pure inflam: & perfectly so & this is pure a Vinous Spirity but a Sensible Oil of Wine may be in it & carried up by the h. of Burning Spir. The only inconvenience is if of it fixed lies Alkali remains in & Bottom perfectly Dry & in very difficult to get it to pure

To Ether specific Grad when alcohol & except Ether, V. is volatile but not in proportion to its lightness or mere volatile & Ether Sulphur or Ether is specific & volatility always & same as depends on one another

Alcohol requires at degree cold to freeze it, freezes at 20 degree below nothing of Ether, but if mixed with other Bodies will freeze sooner as Spirit of Soap, Hence in Wine will freeze in 9 or 10 degrees of Ether.

So far for its Volatile

Now its Effects on other Bodies

It is totally perfectly and Vit & Vol. Reduced and Dissolved destroyed & properties of Acid & Alcohol & Water called Ether. Acid.

Moreover a new substance generated called Ether. Alkali. Chymists

Its volatile and fixed is Spontaneous Ignition considerable Dr. Fixed & and changes of Colour of Acid & Water

Other Notes generated contrary Heat & Heavier on Spontaneous changes in a Phlogiston of Ether

(90)

cf. The Vol. Alkali is precipitated in crystals made the Aqua Helmont, it is made by dissolving the fixed Alkali in water then add of Alcohol it attracts the Water & precipitates the latter

Menst.m Alcohol	Solvends	Means of Solution	Result	Subst. Gum
	Essent. Oils	addition	dissolves em	
	Empyr.	do	do	
	Fossile Oil		do in small prop.n	
	Esp.d oil	no Effect except it becomes	made into a soap	
	Soap	addition	dissolves pak Spodeldock	
	Hepar Sulp.	add.n	Tinctures Antimonii &c	
	Caustic Alkalis	add.n	Soapes	
	Mild & N. Salts	no Effect	except precip.d amm.a	
	Metals & other Salts	no Effect	except	
	Metals undissolved Hepar Sulph	add.n	Tinct	
	Veget. Subst.	under w.h Resin.s	pass into Gum	
	Animal fluids	coagulate		

The dist. ales alcaly & Alkalies in their form but not their
mild, but on that other consid. & effects) i.e. if they are
joined with Water or Alkalies, perhaps that just of a Saturated
Solution of Alk: Fixed Alkalies also affected in
just sufficient to make it Crystalizing (?) Dist. of Both or have shown

It perfectly dissolved Calcinated marble & Lime of Salt
of Tartar with shape, but if Alk. were taken dry the off Lime
was made by it Alcohol in the Soap. on if Fixed is evaporated
remained Soap, Marble is left.

If mixed with the Caustic Ammonia in order) & the Volatile
matter Volatile Aromatic & the more Alcohol is added the more
all will be precipitated & Ammonia & Alk. & Lime left.

It dissolves none of the Neutral Salts but had some
effect on their Solution, rapt had out of Old Flesh. all the Salts.

It dissolves the Spirit & Empyreuma Oils perfectly
thus cast them clear off & separated it dissolves not —

It dissolved Camphire but in very small Proportion
won't dissolve it separated Oils.

It dissolves acidly Ether & the Dulcimatic Ether Andrews
of Mannite or Spirit Dulce.

The Alcohol won't dissolve & separated it, divide appears in
Alkalies i.e. made into Soap —

It dissolved the Sphere when in a Vapour have found
Lines Antiquis: &c

The Alcohol has no Aff. on Metals or their Salts at least
perceptible. But has Aff. on their & other Salts i.e.
all Salts dissolved except Salts. superhaus

However it may be mixed in the Metals of dissolved in the
Vapour Sulph. & dissolves them also

Has no Aff. on any of the Earths but easily dissolves
in many proportions.

An Vegetable Substance won't dissolve the Leaf but
the Resin takes not the Gummy, if the Vapor rises first
but the dissolves the Gum. Leaf Resin & Gum separates

(a) (662)
and the same that we call Air as d ~~Atmosphere~~
yet exposed to Water & therein dissipated or if separate from
one Vessel into another

(b) It has been supposed that it might be got from the
Muriatic if it could be obtd very much concentrated w
it cannot from wr bd necessary to condense its Vapor
but Dr Thordyke has appd the Alcohol in y state of Vap
& y have remd separate, ~~not~~

that old Gummy redisolved into & the Resin in the Spirit of the
hot added each will let go its solvent since the Inclination
the Spir conts to an excess it would a fine

After to Concent Subst coagulation acid & Spirit Vitriol
also W.r also a Dark white Floccus not do this by separating
of two only.

With of Vitr & Nitr Acids produce
Ether w.h is divorced from Nitr Acids & Nitro being
prelim'd their solid from Mur Acid & Alcohol Vap
but W.r never could see any upon his Experiments

Formation of Ether from Nitr Acid we apply of Acid
well & Nitr. Water Content is inimical Ether but we could not
separate it mix'd in close Vessels to prevent Alcohol
Vapor & prevent Effervescence hence prefer upon
surface is used & washed & Vessels is constrict surface
by means of Vap separates it & Contents stop.

We add if Acid sold Alcohol is mixed & Effervescence
then if we add Alcoh hot Acid we also and Stopper
sold by put into W.r or Snow.

The Ether is not soluble with W.r Acid hence when
separated swims atop & always we Cork the bottle Whale
No Stoppers ever hitherto stood close the Ether is immediately formed
upon & increase of Spirit let it stand 2 or 3 days &
then separate by a dep Vessel

But this a very dear way this the same Ether which
made from Vitr & Nitr Acid if cleared from Acid

The Vitriolic Acid & Alcohol are to be made as
pure from W.r as we can: Yet Vitriolic Acid with
Stopp will do but if Alcohol and Stopp should
have of W.r taken from by of Mild Alkali

Alcohol 2 parts & Acid one graphic is hot so sweet
and Acid is cheap we are Equal Weights w.h gains no
more Yet ~~[illegible]~~ do take bread gradually & should be
in Closed Vessels ~~[illegible]~~ (a) at Velocity in Earth & summed: easily cont'd

There is a part of the Acid & Alcohol calcined into an earthy substance & parte of it also ponderous. The Retort should be very large because of the ferment upon boiling is apt to rise in Bubbles & boil over. The furnace must be double & must be warmed when we put the Retort into it least the Retort break.

The Liquors must be applied warmed & first strongest heat as they seem. Oil & other thos volatile & vapourous are not elastic yet sound they & Eggs must be cured at Lukewarm heat by coagulating & bubbles of Eggs.

The Dry is sal tobacco & Other bracy come over quickly but care should be taken of its easily to apt to boil over & Bubbles arise we may let up the Retort & receiver.

The Empty of Other & volatile Alkali is applied & there appear white smoke hence so applied & Lukewarm & they thus separated is not firm.

Some have recommended digesting the Acid & Alcohol some hour before distill. but this is not proper as the Vessel may be kept up above but some Other will escape & partly turned into Oil Dulce by this digestion, ingredients fat than in the distill.

In Spirituous liquors, Other wine & Oil Dulce is come over & Other.

These substances are to be separated by distill. as in Alcohol & Oil Dulce is come over & Other.

Oil of Vitriol & Other comes over hence sep. from Acid by its volatility as the Other comes over & Volatile Acid proceeds with Oil & Alkali. Oil of Vitriol must be in Acid. but we endeavour to get rid of Other by distill. by distill.

It is an Oil of Vitriol spirit & of a clear solid or fluid body, so unfermentable perfectly so least motion for fermenting any smoke; No flame is clear Oil of any flame.

Acid most volatile & volatile exceptible Chemistry Volatile Oil & Acid respired upon the stream fuls cold from this volatility & quick vapour.

The Acid was made to distill & Acid get it is again capable of being distilled with much of Dulce also a sepa-rate; a particular nature is generated by digesting the Acid & oil & Acid & Oil Acid gives a smell like that of Vegetable Acid & generate Effervescence.

Menst.n
Other

Solvend	Meaths of Sol.n	Results	New Sals
Vitriolic Acid	digestion	Ol Dulce	a Salt
Caustic Alkali	by long Digest.n	"	
	in a heat of 90 D.s		
Infl Sals &c	addition	Solution of them	
Resins	Addition	Solution of them	
Amber	add.n	solution of it	
Metals	little or no Effect		
exc.t Gold	extracts from Aq Reg	& after w.d drops let fall	
Earths	no Effect		
Water	soluble and in small q.y		
Arsenous Acid	in Arsenous Acid is Separated		

Allum may be dissolved in Chymical Menstruums by Long Digestion but very slowly and Oils do dissolve it at 50 or 60 degrees of Thermometer Oil of Tartar can Dissolve it but not exceed 90 degrees of Thermometer

Dissolves all Inflammable Substances as Oils of all sorts Alcohol Sulphur. Also Saline Substances, as Common Salt Alcohol imperfectly dissolves but Allum

Has little Effect on the Metalline except Gold. it dissolves Gold as Regale is allowed by Nitre Often, Tho hold fast Hold Bones

Has no Effects on Earths, but is Soluble in Water smell dies in Water. — Its Effect on the Animal Body are most considerable of which to Morrow —

Ossa Mel Mont

Lect. 4 p. 5. On the Properties of the Inflammable Bodies

Have now gone thro the Chemical Nature of Alcohol Sulphur & Water, we shall now come to their Medicinal Properties.

1st Sulphur hardly soluble in any of the fluids hence has Effect upon the Machine?

But from some small Dissolution in Water by its Acrid nature stimulates Intestinal Canal hence Purgative

Hippocrates whether Substances can act upon the Nervous Power without being soluble in Water or our fluids this does happen in Cases of Phenomena viz. But Sulph cannot act this wise as it is solid & not soluble in our fluids.

Heretofore Brass no Action on the Nervous when applied but now it is a certain poison to many Insects. Nitre we cannot act whether it promotes or Hinders Liquors disturbing Action or perhaps its Juice to Volatile Smell is probably the Cause

Hence used in the Itch in the Vitriolic Volatile Salt does not act upon the other Parts of the Body as Mercury does which might thro' one into a Salivation &c.

Almost all the Poisons will kill the Insects. Some of the Vegetables will act without Contact the Body, but the most

in general have may bad effects. The bile will be made on
hereby bile in ye Intestines especially greatly. Most of these
Powders kill the insects sooner but not so safely as Sulphur
It is a common practice to give Pinguet. with Hob. Gelfor
id and. It cannot be for Repeal to take off ye Inflam: It may
be hurtful as it weakens ye System & there little Inflam.
are more lasting in Weakly than in Strong Habits. Hence
Purgatives should have bed effect. Bitters surprising how
ye Infatuation People are carried in Physic. upon weakness
a Curious instance in Sydenham who orders not one but two
Purgatives to be given in Hysteric Cases. And hereby they
are always worse. Yet he orders in a long Table given
Purgatives in Scurvy not required only to keep Body a
little open, by Direct in ye Premises Vice in Constitution
generally ye increase of Disorders hence we where begun
to Heal every day.

Sometimes when we want to keep ye Body thus we
actual daily use Cant use ye Salts & Purgatives as they
Cool too much neither can we use Bloes Because they pro
duce Stiff. nil haemorrhages & Menses & Haemorrhoids
hence an excess of menagogues & increased Bile. hence we
find Sulph. of Iron & Vitriol rise in the Pulse in preference to
others. It certainly is an act opposite involuntarily in ye Inter.
System.

We are now to consider ye Compds. here cons. ye Elements
Sulph. is soluble in ye Alkali & Spirits & bile makes
Aether & Balsam Sulph. where Chemist but not medicine
given know come to their Med. Particles.

The Aether has both the Virtues of ye Sulph. & Alk.
Volatile action of ye Vital Salts don't know more of ye Alkali
It is no inconsiderable solvent on our fluids or solids
therefore has a little effect on the Brain. Yet if the effect
is too loose prop. it becomes a solver of ye Coagulated Juices &c
It stimulates & pr. commit. & w. estimulous & nothing
else. The formulae & Part alone

If Appl. lord Stom.ch stimulates it & whole System
it is not by a spasmodic affn. nor does it relax the pores when
as all other Stimulants act by a spasmodic affection and
w.ch also takes off the spasms —

Salp. Procures sleep not the effect.
The Ghen.: Oils act altogether on the Antispasmodic
Its disagreable smell prevents its frequent use & Stomach
to & skin or perhaps might be of use. It never used in
clam. lord Mouth as its taste is disagreable —

Asfet. lo & Stomach & has no spasmodic or Antisp. Virtue
but occasions a sweat. It stimul. & Stomach & whole system
Hence used in Rheumatisms, & Tinct. Castor used for
these purposes but as Affections nervous, as in proportn to & Nth applicn
more of the opd. Regulus is deposed.

The Hydrodes wear use stimul. Stomachics thus
In dysenteries it was often by to take opd. Fritt. & Bezoars
& Castor. for this purpose a number of Stimuli have
been applied just before the fit as Pimpinella Garlic
Antimonials, neg. Snake & Cordials &c all these act by
exercising the Acts of Nervous System hence recovery
act slowly indeed & seldom to occasion spasms —

There is a differ. between Rath. offered & spasms
see Medicines prevented wont take off a spasm.

This Hon. Sulph. enters readily into Bl. by & Soluble
and Sweat but can have no effect as don't dissolve rather
can it by application lord Solids. There is an Acid opd. Stom.ch
for w.ch & Aperi has been prescribed & Alk. blunt & Acid Bl.
& Sulph. then passes quickly but it is seldom here not so much
used, the Acid Sulphur. prevents its getting into Blood, but not
its stimulus exercises & Discharge of Urine hence used
for these purposes, & as a Rectoral & Sudorific.

We want a Diuretic w.ch would be a certain Diuretic & other
by its retn. on Stomach or by gross bodies neg. & Other
exercises & Discharge. Therefore a Number recommended
Acid & Imbibitors among others as Pot. Clay but it seem been

one: If we had any certn one would be of consequence in Diseases where a fluid is to be absorbed & evacuated. Ward seems to be possessed of one of these the Secretary so much boasted of, by perfuse sweat & discharge —

We can not trust to any of those we know but it is worth while to enquire diligently.

However a second Whole of Aegar is now known and of particular but many be brief are Diuretic when administered

Sulphur seems to dissolve blood same way as Salts are supposed in lb. Hence we may expect Virtues of Sulphur in these Balsams. It are a considerable Stimulus but not so much as Aegar.

Applied to Skin it cured Itch but smell disagreeable would also purge in this dose. Little found Satisfactory

They are taken up by the Chyle & seem to have considerable Effs and Virtues, Hence where there is much tongue used Mucus and Tongue & degree of Inflam. These may be used to Sweep. They may encourage the discharge of Urine & Mucus But are not to be used in Pleurisies Peripn: or Catarrhs where there is Inflam.

They also act forcibly powerfully and Secretories as Kidneys & Glands of Skin.

Hence Sulph. is used to kill Vermin Yes a Gentle Purgative. The Aegar is of little Value but worth big cos a Diuretic. The Balsams only of use as Pectorals in Cold Cases.

We come now to the Med: Vertues of Alcohol a Medicine of much Value.

It has considerable Effs on Stomach & Bow: and Machine is very considerable applied to Skin from & strongest Astringents except such as destroy it Skin as Concentrated Acids

Applied to Fluids coagulates all that are coagulable & considerable Effs

It is not a Stricture of the fluids therefore as the Acid coagulates them.

The Skin hard same effects nearly as Acids viz an astringent on the Part but is spread further Acts upon the Nerves in Rheumatism thus a combination of Antispasm.

For these effects it is applied Externally, as Astringent both to Acid & Alkali Bodies & a Coagulater & Antispasmodic.

We apply it to the Skin as an Antispasmodic for Rheumatism as Acids again Strains it is a better Antispasmodic than the Acids but is not proper to be applied alone but the Acids or the Volatile Alkali should be applied first & therefore in Rheumatism not considered combined with Acids & Alkalis but mixed in a Chem. Solution.

In a slight Inflammation tried Skin takes it off as an Erysipelatous but if Inflammation is below the Skin it acts as a Stimulant but if tried Skin it exerts its Antispasmodic virtues in that part in particular as also in the whole System but not so much & Extents its Stimulating Quality into so much the part and Neighbourhood hence used in Erysipelas.

It applied externally as a Stopper of Haemorrhages happen by accident of Aneurisms & we evidently see that Haemorrhages are attended in Inflammation and Erysipelas in the Slight bleedings from Nose. It takes off the Spasm and Repels in these Cases. It coagulates the Blood in small Applications but not to be used in large Wounds and encreases the Inflammation to a great degree by stopping the Discharge. Hence only thus used in small Wounds & also in small Scratches or rifflings of the Skin Spread Suppuration & coagulate the Fluid into a Coat in order to the Inflamed part till new Skin is generated but to deep Cuts is not to be applied as it encreases the Inflammation & Suppuration & Mortification consequence

Applied to the Stomach have different effects from those it has when applied to the Skin. and that even whether applied in the state of Alcohol & Wine to the Skin is Poison but to the Stomach stimulates

There is a partie class of Medicines which are Narcotics & Stimulants & 3 sorts Alcohol & Wine contain it. Opium & its Preps. Lead. They take off the Effects of others Stimuli but Lead is

Alcohol & Opium in their gen. properties agree much & have also partie. ones

1st Applied to the Mouth Stomach or Rectum exhilerates & produces giddiness but harmony this when applied to the Skin

Opium has this Relax. Property but not so much as Alcohol nor so much in those who are not accustomed to it those who are in wine is similar to Alcohol after this they begin to decay in sensibility & mobility of the System & this in proportion to the latter

by the Destruct. of the mobility we mean besides the Body runs into Spasms There is 5th difference between a Preventer & Takes off of a Stimulant this seen made in Wine & when we have drunk much Wine the Wounds got are not attended so much Inflam. but after taken after & Wounds encrease much Hence Officers before said to drink Wine before Battle. It also prevents the Bad effects of Cold

And this shows that Dose of Opium being the Cause of Inflam. & not so to coagulate Juices but nothing & Effects. As a Man when drunk desponded to Cold w. be as detrimental to have Pure Bal. Medicine with Destruct. of Mobility prevents Fever

As they destroy the mobility they afterwards do the sensibility given in greater Dose. wd. mill by a cloud of Ward Powder Tenderly but before this they go on increasing & the Power

and yet destroyed sensibility & this not uncommon
Act. & sensibility not always to be avoided as in Palsies
or hence & sensibility is & Action & Ana & Action
without sensibility

They differ however in these dies from each other Opium
destroys the sensibility sooner but Wine after perhaps leaves
weakness longer exhilarates. In the first destroys & Act. & sp.
hence they are partic. in & excess it more & more like
they entirely suffocate it.

However in many cases of ex. cus they take off the Spasms
and cause pain Excess of Pain is the Cause of the Spasm
in a stretch of a sensible or Nervous Pain &c. The Pain
is one in these to the Spasm and large Vessels for the
intestinal Vessels. Hence Opium used with & off the Spasms
& Convulsions to which Wine is not so proper for

In Suppurations as also used on in & Smelle Bore
where the Suppur. causes & pain hence Opium is of use
between & Suppr. & Inflam. but of & Smelle Bore must not
be used till & Suppr. is begun

We use Opium also to take off & Spasms in Wounds
Solemn & this & Wine by increasing & sensibility and
mind & excites the mind & Body take off & Spasms &
increase Gen. & & present by destroy. & sensibility hence
& use of Opium in Apoplectic Cases or Wine to keep off &
immediate Fills till Bath &c can be applied

The & wanderer em is to assist digestion by this
stimulat. & Stomach & Wine excited in these countries
& Opium in & Mahometan where Wine is prohibited.

Wine under dinner. to make more wholesome is
liable to diseases & Low Fevers therefore those who can
afford it. So People whose Stomachs are weak are more
liable to diseases, for & Disease will more likely attack
people who can't digest their food properly & aid time
Crew should not so universally overcome & hollow
& at & same time very lasting change of Col. Chali
or. Eun. Cols are very short,

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Hence Wine more proper med. after and of Severe Men any other Liquors as they all by ends energy & Spirits more Cordial, etc & better.

This is a very hard Problem to resolve why so short stimuli not strengthened should be of such use & they are by supposed of Strength of Nerv Power. The other stimuli not Liquors so good. The Wine doth energize quick & effectually & is peculiar to it amongst other stimuli it alone cumulates the Nerves & destroys probably Camphor has something of this Power.

Wine therefore when and Power of Nature are weak shall be reliedon.

Cordials Wines are not equally proper Alcohol is not so good as Wine and approaches nearer of the Spirit Bile

Opium is not to be given to assist Digest. or keep up of strength & it makes it Liver Worse. Given to Inconvenienced & to make drunk & away with them. But in those who are accustomed to it may be given with Liquor succeeds or Fermented Wine Dew.

Is of Opinion some Cases of particularly a Lady who had accustomed herself to take 2 drams of Day & she totally advantageous a Liquor of Wine.

Go to of Choice of Wines.

They differ in of fruits they are got from. Those from Liquors & Juices of Fruits are only to be used to keep up the strength Wine from Malt or Honey as Ale or Mead are not so proper as their Mucous Palate of Stomach.

The British Wines as Cherry &c. and Elder &c. not encreases the Strength in Proportion to their Quantity. Therefore never to be used for Liquor Power. — New Wines & Sweet Wines always ferment in of Stomach hence not proper unless their Strength balance the Sweetness, but Madeira, Canaria &c.

where the Alcohol prevents the fermentation. But in such
local Wines are not to be used.

The Spirituous Liquors are not to be used neither
they are not to turn sour on the Stomach & this or
any other Distemper in the Primæ Viæ always increase & they
some are more agreeable to Stomach than others &
these are to be chosen if they Brownness or Clearness doth
counterbalance that good &c. Claret is very agreeable
especially to a Stomach accustomed to Wine hence
most proper to keep up Strength

Upon a whole should chuse a strong old Wine
not too sweet.

We often use Wines to convey other Medicines into
the Stomach. And these should be chosen with same care
& should be strong & old for then uses as Menstruums the
Condition of Men be got without Brandy mixed
Wines proper. The Malmsey Madeira Sweet Midder
ranean Wines don't do like very Old.

This shew we must observe of Wine that after their
Operation is over they always feel weaker & lower, hence
not to be taken but at a time wanted as a Cordial after
Diuretics not before being exposed to Infect Acrimonious
good Effects. also before being exposed to Cold, also for
Anasomiots, but Wine & Opium always weaken in
the end therefore no Stimulus whether Spirituous Carminative
-ative should never be given but at a very time wanted as
this Physicians are in general faulty they order Hysteric
Medicines to be given in Hysteric Cases at all hours.
a proper time & in their absence doing
by this much harm.

Cont. of the other Med. Prop. of Inflam. continued

The properties of Alcohol & Sulphur are well known but of those of Other Oil Parts & of Animals are little known but I find for good Medicines their effects are uncertain

They are good Antiphlogistic Medicines but have their disadvantages that they only ease for a minute or two & the disease increases in every return but if blood spunge are always removed

Other is the best way to take off pains and discourage Swelling & pains especially Inflammatory Conditions, also in Opisthotonos & the same pains & symptoms to Fevers ~~also~~ also where pains on any or Convulsive Limb but having already caused effects, it generally afterwards time having been but little.

I remove pains in parts as the Head & neck & from to drive pains from one to another part to & other being applied & Disease is removed.

Two Heads which depend upon Inflammations of Internal parts and to pains and Integuments. Other pains remove & pain. & the Effects are more remarkable & Deliriums & Convulsions are two long Continuing. Certain Blood & Other have removed these but pain returns & usually the Cause is not removed & return is greater & more because there is a general Rule that Antiphlogistic Medicines & Bleeding are Bark & Bitters & Opiates have no Antiphlogistic Virtue & proves also in some measure Inflammation but & volatility renders these inconsiderable unless the Queen pain fed from Not Vehrche and Stop Bowels but some pain fed after & Doubtful

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Inflammable have not been very much tried. Flowers
[illegible] to the whole body, for that seeds a thousand
times the whole body. but is not a preventer of fearing & only
takes away in the paroxysm. as in Epileptick & Hysterick
fits. & has been good effects where given in a parte Colo-
nic pain that put on the fits before the fit & has prevented
the fit for some hours.

I & I might therefore conclude much Epileptick fits
have not yet been cured, yet may be carried off in such
a manner as the Hen carries home to her chickens.

In Influenza & Dropsies Other Fodds seem to be
proper as being stimulant. Mr Wood came to Lon-
don in this Influenza & was cured but by Influenza
returns with Violence. but this only in the weak
& learned, but in a letter cite of Boerhaave was cured
removed by Other, & Fever for two months
in the month of May, by Wood.

In prepar the Other & Wood it should of Alcohol was not
sufficiently pure nor the Vehicle Acid & it concentrated
but in meaning the Ether it contains Alcohol & it makes it soluble
in Water, but it may be remedied by adding more Acid &
redistilling.

So far Lord Bacon's Virtues of Inflammable Bodies
should now given Theory is known of their Constitution

All Inflammables are either Oil, Sulphur, Alcohol &
Sugar is to be ranked among the Vegetable Substances
Oils. It is a question what proportion of Phlogiston
Hypothesis as Bacon were very Inflammable

From its dull appearance & all Bodies not being
Inflammable this probable Varity & Phlegm in which it not
inflammable but as its combined & Acidic Substances

Chymists to have said that Acid Water & Earth were required
in the Ph. to make an Oil but Acids are only got from two
Oils and Acids & Vegs by Distillation. Tartary Oil got better
from those parts of the substances and Acids & Vegs but
hence it is probable Acid is here only adherent

As for Earth it only seems have for saying this insipid
easily dissolves Earth and which Sulphur Earth was not in
Oil but generated all of it probably, and may be long
exposing any unbalance to the fire. Yet absolutely seems
could not whole wholly vap. Sulphur Earth has been converted
into half its Dry Earth —

We have no reason at least to suppose Water
is an Element nor is it not as we can't tell got from
Vegetables Oils but the Chymists endeavour to prove it by
saying that if we distill Oil Acid Alcohol, Other inflammable & Water
but Oils would not be got if Alcohol & Acid were perfectly consumed
Sulphur seems to be made of Oil Acid & Sulphur. Acid
whether any other substance is not some thing
It may be made by calcining Oil & Acid & Sulphur & Alcohol
But Oil Acid & Sulphur are indeed Sulphur
But Oil Acid in one case joined with Sulphur makes Sulphur in another Oil Vitriolic
Acid perhaps of Sulphurious made by the Decomposition of the
Oil & Sulphur is same probably for if the Vitriolic Acid & Sulphur are
distilled alone a Oil Vitr Acid is obtained, but if Oil be added
we get Sulphur.

Alcohol perfectly inflammable & nothing is separated from
it by its inflammation.

Sulphur compounded of Oil Acid & Sulphur is always
a compound. The quantity of Oil is got and here Acid.
This is proved by some Acid in Sulphur Alcohol and
Sulphur is decomposed in Distillation and Oil and Sulphur
Oil seems only Solvent and Sulphur adhering. Small Oils will unite

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Acids

the ~~Oil~~ the can hardly be separated from them but yet is not perfectly dephlegmated ~~perfectly~~.

It is evident that the Acid & Alk when combined compose Salt yet being dry'd contain no Water. Some have said that Alcohol contd Water but it can't as we see it may be made from Salt Regen Tartar & has not been conceived of Dry'd. But Dr of Phlo or Oil have in Alcohol is very little. Several Authors have endeavd to prove that it contains Wr & brings many Experiments. I say they the Alcohol when burning its fumes condense into Water but their ~~when~~ Not always ~~produces~~ affords Wr. from the Atmosphere as it condenses.

Another Proof they give is that Alcohol & Alk & Acid distilled together yield Dr & off Wr is got.

The only Exp^n seem to prove is that Alcohol comes from the Alkalis mixed a Soap. Van Helmont calls Sassafras Soap perfect but not white, but transparent. Another Prometheus agrees with other Soap. Van Helmont says in Distill this Soap one half of the Alcohol is got in form of Alcohol & the other in Water. but this has not been sufficiently tried to be conclusive.

The Decomp^n of Alcohol by the Vitriolic & Nitr Acids Singular. The Vitriolic Acid seems to attract the Phl^g out of Alcohol, nat. Vol Vitriolic Acid & the Alcohol itself is changed into Ether it seems to be about 2 Thirds of it generally used, but is so volatile that we have great difficulty of Ether. This Ether seems to contain second quantity of the Acid.

Whether or no this Ether is a new Comp^n either made by the or Vitriolic Matter or some other substance or perhaps by the to get third the Oleum, or made by lost of Phl^g leaves taken from Alcohol is not at all improbable.

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Sulphureous Acid is sep. from it by the Acid of Vitriol
Acid of a French Gentleman, said second, mixt the Acid
into a Vegetable by pouring it upon it, it burns new
of smell like Sulphur, but is evidently got from Sulphur &
not pd. Half Acid.
Inflammation seems to be a solution of the Phlogiston
in air by means of an Electric Attraction, air is the
attracting it more strongly than it other substances do
when combined, that is generally here as in other
Electric Attractions, but some Substances containing Phlo
don't deflagrate as Sal Alk. & Metals, if Sulphur &
if Metal had a stronger attract. to Phlog. than
that. We shall now look upon Composition
of Spirits in Fluids according to the respective Properties
ordered by Chymists, it makes curious for Chymists many Bodies
as bark may be made into a Strong Spirit Alcohol but every
each of Alcohol has water mixed. The Spir. Jon. such
contains from 1/3 to 1/4 part of Water.

The White Wine prescribed in Gravel & Stone is an
Salory for Tinctures & Mountain & is improper in
it is sweet & weakens apt to ferment in the Stomach &
Inflammate it Gaps & Eller in the Stomach & so weaken
it & Medicina & other Strong Wines are much better
for Tinctures as in Bitter ones of Wine makes the Stomach
for & Mason's insensible lost Vauxhall report, Bitter &
has Wine have to the influence, before that of the Wine
In Distill. of Herbs & Salt is order. the Spirit
& its Substance & Then afford more &c.
The Ol Barrie & some Impyreum Ess. and Extract
this Juice, but is only used in Medic. & Head ache.
The Ol Succini Compos. is generally an unelegant mixture
& Hill & Inadon Below & most in the Brute Veins

Of the Tab & Nitri dulc there are only Solutions of Ether in Alcohol only and we have commonly shake Hydrochloric Acid & and other of Vol. Nitric

The Col. differs not from the Later & latter had Excelle Col. with which it mixed again Red.
Hydr. Sulphuris is much sweet to a little of Alch.

The Purific. of Sulphur is a very proper way.

And lastly Precip. was from Seed contd a quantity of Solution instead of Vinegar then the other Ingredients.

The daily Cerum Precip. mixture and Ol of Antimony contains.

Simple Water

Any Generally contn some of the Essen. Oil and Wr. but generally yeld considerable Impregnation Copper contn it Cuvot. Those Water from their Impregnation are very disagreable to the Stomach & especially to sick Vomits the Infusions of the Plants must be much preferable

The Aromatic Wr. is only the Essential Oil dissolved in Alcohol & mixed with a little Wr. but they are not better than Solutions of the Oils in Spir. Wine indeed can be better sweet. They are perhaps indeed more agreable to the Stomach on Acc. of the Alcohol then of infusions in Water.

Mixtures in Wine & Mixtures.

While Wine improper. Madeira & Lisbon the College seem to have been sensible of this & have ordered that Orders on that head. Alcohol should be added before their fermenting

The Dr Charge is a solution of Ferrum Ferrum Ferrum
is varied according to strength of Wine but a Stal may
be taken in good Wine is enough Medicine

The Dr Tincture of Camphor & Antimony being variously combin'd according to strength of Wine out of this Lorcaster.

The Tinctures in Gum Resin ought rather Pure Alcohol or Water alone should be used in Tinctures, but when we want a solution of part of the Resin & part of the Gum we use Vin Tem aromatic

The Tinct Cantharides often a more than a Tincture of Lepers & Phlegm. the remainder this a little of the Regulus.

The Tinct Olor Succ is certainly improper as the Alcohol dissolves little of the Salts.

The Other Tinctures and Dr Saturnina Co may have of some Objections made

The Tincture Myrrhae ought to order to have a Tincture of certain strength should be made first by making a strong of the Vegetables as Galls of a certain strength and then adding Alcohol, for if Brandy we give a Tincture of both Ch & comes over and takes a product in how strong that it is Ch & uncertain. There is as much in and Brandy as to dissolve little The Tinct Myrrhae is certainly only of Vehicle Aqua & a little of Alcohol converted into Other. The Spirits must rather make it worse by it cause an Impure amalgam and id. co & their effects are spoil'd by the Acid destroys of Ingredients of the Plants & we know of no Virtues, it seems to depend on it Dr Organization. This time fou differ little from the Spt Vitriol.

Tinct Pix Dulce

The Tincture of Camphor & Mosch is ordered to be made by means of Sugar in suspend a little Gum or Lettuce but Gum Camphor is not dissolved more but the Tincture will, that Camphor is not so good when as giving him in Pills, by the agreeable quantity carried down by the setting Lettuce Tube and Stomach —

Lect.ce 47.th Unaffected Metals &c

Have hitherto considered Salines & Inflammables & Earths we come now to the Metals, it being necessary previously to understand the other

A Metal is not soluble in W.r hence nothing moved from Salts, is not inflammable hence distinguished from Bitts

Zinc indeed seems to be inflammable but notwithstanding what is applied to sublime it

Metals divided into those Malleable & not malleable the first called Metals & other Semimetals, & Divisions one sense improperly called Metals, yet is suff.t to mention some distinction between them

Metals divided into Noble & Ignoble there is no exact distinct.n as Noble are not those volatile yet even Gold &c. may be suff.t. It is applied they were said not to be calcinable but Silver by suff.t fire may be calcined.

The Gold & Silver not so easily adulterated as other not altering acids as others do hence used as Coins.

The Malleable Metals are 7, Gold, Silver Copper Tin Lead Iron. Mercury all pure & with any mixture

The Semimetals 87. viz Zinc Bismuth Regulus Arsenic, Platina Regulus Antim Cobalt & Nickel wrongly said by German Chemists to be Regulus one. few of the Semimetals were known to the Ancients. It was but lately found that Arsenic could be sep.d from its Salts.

Cobalt but lately known as to Metallic form the we know it in Blue Glasses & Chemists.

Platina was only p.d out since the find into the West Indies.

Perfect Metals have been known from earliest ages. It is possible New Metallic substances & volatile may be discovered as in Sea Water fresh Land or we

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discover more of ye Earth.

These Substances are altogether more: the mid Substance of ye Chalks, and Clays, or ye Chalks of Alkalies. we shall therefore treat em not separate

1st Consider where they are native whether they were made
2dly ask How they can be got pure from everything else
3 Metals
3 Consider how we may separate one Metal from another
4th Consider ye particular Properties of each of ye Metals.
5th as to ductility malleability
What Metals roll more in one another
6th what solutions are made of em
7th
8th their Medicinal Qualities, many of wh however we are not well acquainted w.th

And last of all consider their Composition. shall my gwotte Generals of these things. Indifferently give and take up one course of Reflexes

1st They are ye native ind 2d of ye Earth never many Animals or Vegetable Substances Wholly improperly indeed rated.

It has been asserted that they were Iron formerly by the French Chemists Solid, or from Glauber by Calcination along w.th ye Earth but it is probable upon both over their procedures that ye Iron might be ind Earth in em, as burning ind a Muffle, and Dr has done nothing was soft ye Loadstone could attract.

Neither are they wer made by art whether natural as fermn or Artificial as Solutn Several Earths have indeed been seen solid made into Metals but it was evidently in the Clay before Calcinn as tinny hd been washed out of Mineral Ore

2 Are found native several ways
1 In great Bars Metallic form

2dly found with Acids as and Vitriolic
3dly in Metals and form of Calcs
4thly found with Sulphur & most common was
5thly with Arsenic. Or sometimes with both Arsenic
& Sulphur.

The Metals so found are Gold Silver Copper Platina
is the former very often, Quicksilver also often. Several others have been offered to be found in their native form but Gold Silver Quicksilver & Platina can be only properly called so as Copper is only a precipitate of its Solvent while in the Earth by its mixing with Iron Ore, & forms a Crust of Copper on each side of Iron it is here shewn hence are the Native

Metals so in Calcs & showed in Acids are of some heretofore should imagine that they were solutions precipitated by mixt with Calcs, Earths & Alkalis. however the contrary seems to hold in Zinc as its native & cannot be dissolved in Vol Acids after have been in Calcs. That is most clear unacountable and is very probable Semimetals & many plants in the Earth are so hot as to make come up and surface of the Earth in form of Calx.

The 5 Metals capable of being joined with Sulphur are Lead, Iron. Silver. Copper Mercury

In only joined combined with Arsenic alone without Sulphur the Metals combined with Sulph & Arsenic together Silver Iron Copper Bismuth.

These are the foundation of all Metals. of Ores particularly of the Ores of the Earth but Willis's natural History of Fossils contains them all.

All Metals so either detected and Ores of the Earth of for the most part in Veins & it seems probable that Earth was once covered over with Water in the Deluge

Substances gravitated certain depths according to their Gravity or at least that similar Substances were collected in Strata, & each Strata of diff. appearances as they go deeper.

as also in Coal Clay, Earth &c

But if Metalls anthrendly were in the Strata. But it seems to have been thus viz. covered Earth being Dissolved Earth cracked as dry'd Clay does & the Metalls fell into these Crystals, w.ch this probable were all filled up with a vast of Vapours w.ch in the middle formed the Metal into a Crystalline form by making it rise hence found in veins, as we daily see in fissured Rocks where Crystalline Substances are formed and that Vap.rs arise we observed Stand upon a field & that upon a Cool and Same that and Earth is dissolved sooner the Vap.rs arising also have different Nyln & diff. Earths

Nor Quarts

The Substances united with Bres Mynerals Crystalline Calcarious Earth, & Selenitas with Sy & Mercury composed within Worms & Spars.

The Fusible Stone is of greatest specific Gravity of any Stone but Metalls upon selves are a Comb.n of the Stone & Calc Earth

Those Metals that are found native on these Bres generally run in Veins.

Another Reason for imagining that the Metalls were formed in Veins by means of Vapours is that Metal taken out the Vein is filled up again. This some Gent. said to be so by the Metals not being thrown aside but left Wooloo & workmanship & left found in metalls & Wood decayed by Wet & Putrefaction.

All ores are found in a Crystalline form but also some Parts of Crystals are crushed into a solid Mass.

Iron Ore is sometimes found containing a number of Metals &c

Excellent Rational Vision & Dreams Longevity of the Ores according to different Substances they are combined with

but the ores themselves are of same

Now we come to the Method of operation, & Metals formed from Arsenic

Lib. 4. c. 19 Mineralogia & Metallica & formed Regulus of Spiess

The Regulus may sep. & be calcined & then reduced by great Furnace this is called Driving Fire

Another way is to powder it & throw it on a Coal of Water running over it, & the same time this is called Deflagration

Spiessglass fals to the Bottom the other substances are in a Mass of this separately called Antimony is not pretty pure

The easy & expeditious Arsenic is by roasting but Sulphur itself is not so easily separated this way

The last Method of sep. the ores is by burning & Quartz & Glass by means of fixed substances

Such Medicines as will vitrify Metals & such substances as will unite with Sulphur & other substances as in Table of Mett. No. The 3 Flux is such as will keep the Metals from metallic form & most few something containing an Anim. or Veg. Phlogiston, if so

4th Such substances as will unite with Metals in small Bodies & separate it from other parts as Silver from Lead &c.

For Particular Acc. to See Cramer

To Vitrify & Quartz we throw in Spar already vitrified lining smelting pots and Borax

For the second way to sep. Sulph. we use Quick Lime in some places Soda is used and Tartar way we need fixed Alkali, but care must be taken that it does take up part of metal and Hepar Sulphur.

Fourth way we use Charcoal, or Tartar not calcined. The Lock wood is only used in Gold or Silver, for Lead & Mid stuffs &c. & Gold separated from Quartz & it is again easily separated from Lead.

For an Example of sep. of Metals we take the Lead ore roasted & roasted the Sulphur part of this already

separated from it, there is nothing is required for that purpose but if any is left the Alkali will be retained. then we add two parts of Pot Alkali & little Charcoal & oil to reduce the sufficiently of Mixture in a Crucible & apply it to a Fire under the Muffle of a furnace to make it so fluid in an hour or more by quantity of the Salt on the top of the Salt melting & running and Top, it prevents the Air getting to it & more easily & speed from calcining.

The Best method Alkali is also upon Red & Black immediately separated; the Alkali unites with the Sulphur into a Hepar yet this dissolves very little of the Metal so Hepar in an unequal proportion to the Metals —

Sect: 2 of the 48 Separation of Metals from Each other.

Having gold found out Several Ways & Methods of separating Metals from ores especially when mixed with Arsenic & Sulphur, we come

When Copper is united with Vitriolic Acid, bars of Iron are thrown in, the precipitates Copper into form of bars.

The way of Changing Copper or Brass of Stamped Clumps is to be boiled with Red & Black Lead & Under plates to Cross. The Common way often Metals from Copper Brass is by adding fluxes. as Borax, Arsenic & Sulphur, & fluxes also consume something attracting strongly Sulphur & Arsenic & Metal calcining. in this deep Lead Scoriaceous & they endeavour to separate Silver which is often in Lead ores

Gold is always unalloyed from mixed with Quicksilver & West Indies, & Platina & Land from Silver also separated by Sublimation they also separate upon Melted by Brass & Illustration

Silver is in its pure form or mixed with Lead or Sulphur and Silver ore, is diff from other Ores being malleable

No 18 Lead is joined wth Sulphur much, Lead Tin
in ye form of Glass Globules, those may middle small.
Copper is so most universally in members of ye Tribe
most universally, in all Colors, in the Min^l Waters, tho' yet no
inits purity alone is found wth Sulphur Arsenic &c
Iron is found Sulphur & alone, &c
Tin is always found combined wth Arsenic & alone. Its Ter
~~[illegible]~~
Zinc is ye most Lapis Calminaris, the Lapis Tutie
is fumes condensed, ye Lapis Cadmiæ.
Cobalt & Bismuth are found together in their Ores
Arsenic is found in most Ores & is scattered as Dust is from
the Zinc & my flues of furnaces
The Antimony is seldom found any other way but wth Sulphur
& is sepd by Elevation.
Mercury is found wth Sulphur & pure native
& Ores have generally a quantity of Globules in them.
Platina is found wth Gold in ye Mines.
for further particulars see Cramer & Wallerius.
The Metals are sepd from Sulphur & Arsenic the
next thing is to seperate them from each other as those
Ores wth other Metals, as Lead wth Silver &c

Most Ores containing 2 or 3 Metals are not worth contin
and Expence to be Gain.
The sep^n of Gold Silver & Mercury from all other Metals
are & only ones worth while to seperate.
Gold is generally mixed wth Silver Platina & Sulphur
Silver is united generally wth Lead Zinc &c
Mercury often attempted to be made Ductile, y^t wth Bismuth
not easily known.
Gold & Silver are sep^d by Quartation
The Aqua Fortis did won't dissolve Gold unless united wth the
Lead, & wth Mercury Lead won't dissolve Silver
The Aqua Regia of Silver & Gold will crown into Metals
Lead & Silver is dissolved & Gold unto Metal

If Aqua fortis is used & Gold is dissolved. & Silver not
but if the two metals are mixed in equal proportions &
one hundred & twenty from taking upon other. the more
there should be more Silver in order to have Gold sep & and
having satisfied Gold they add as much Silver as to make
the Gold be only ten times to four. it is then dissolved in Aqua fortis
the expense of so much Aqua fortis induced the Silver
laid aside as too expensive.

The next method is Cementation in which instead of Aq
fortis Vitriol & Nitre are added, in powder & the Metal being
applied to the Lead left with a mixture of Silver.
& Gold fixed to the bottom. they took not a sufficient
quantity of Vitriol & Nitre & Lead to separate
Gold & Silver & Sulphur as follows —

Sulphur dissolves Silver but not Gold they reduce
an inch Granulated by drop into it. & add Sulphur to
under the Silver into a Silver ore, & Sulphur is after-
wards rocked from it. this put in practice in all the
Silver Mines.

Another way is by Reg & Antimony is volatile
& volatilizes all metals but Gold which is left. but there is
another method of parting it as this is not separated from
platina this shews.

Silver added to a solution of Gold in Aq Reg pretty
concentrated & mixed with other Metals extracts the Gold from
the other & then lets it fall & this is a very cheap way.

Gold & Silver are separated from copper by melting of
Lead. which being mixed the Lead buges out with Silver, & being
melted in Cups & then Copper

Gold & Silver are lost by fire from all other metals by
means of Lead with Litharge & Lead easily calcining
all Metals except Gold & Silver. Silver by being kept
fluid may be calcined, but Gold can't but by Precipitation

In this way we separate all other grains from
Silver & Gold. by putting it into a Cupel called, a crucible
being made of the Ashes of Bones & in a hollow form, & thus
put into a Muffle & other Metals being vitrified run into
the Pores of the Cupel & Silver is left pure as was shewn before

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(a) And the Mercury thus precipitated is to be separated by Distillation from those parts of the Menstruum which may be precipitated.

Silver may likewise be separd from it by means of the Spirit
for in the Silver is mixed of Silver brasse & Mercury, and
it is verie lolere separated from Silver by this Capellation
or Testing.

Sulphur attracts the Silver
Lead & Sulphur lead & Sin
Mercury is sep from Silver by means of Sublimation
except Bismuth & Mercury prosperable & to all but
Bismuth & Mercury is offered to the Mercury & this brings over any
other Terrinetal lie, &c.

The way of sep. Gold is by the Nitr Acid & attracts Bismuth
Salt, the mixed Metals being dissolved in the Nitr Acid
we shall have the Nitre of Bismuth & Nitre of Mercury
Cut Copper attracts the Nitr Acid stronger than Mercury does
but not so strong as them Bismuth. Copper being added attracts
the Acid & precipitated Mercury but not the Bismuth Half
Sublimed Mercury & Bismuth Half
Sublimed Mercury & Bismuth
Whether a Metal is pure or a mixed Metal
Exp. & Mixture of Gold & Lime Wrought in Nitr Acid
& Acid dissolves the Lime & leaves the Gold
Gold Rejects the Nitr Acid & Corrosive
Aqua regia & Nitr Acid & Water
Aqua Regia & Nitr Acid & Water
Lowest of the Metals Gold & Silver
Silver is precip. out of Nitr Acid
The Metals that are easily known
Gold by its specific Gravity from other Metals & by
its Colour from Platina
Silver by its Lead Colour from Nitr Acid
Copper by its Blue Solution
Tin by its Brittleness of fusion
Lead by its particular Crackling upon breaking
Lead by its softness & easily being malleable
Zinc by its particular Appearance & being semimetal
indeed this Experiment of dividing metals & semimetals from
each other by their colour or Appearance, but & more
memorable easily judged by their Colour

The Cobalt may be distinguished by its purple or violet red colour in its solution with Aqua.

The Platina is always in a small grain.

Thus we considering with of Metals, & may also know whether it is a Metal or not from one for instance of wood & a Semimetal like Bismuth, ~~[illegible]~~ with its precipitated by ~~[illegible]~~ Bismuth to of solution.

Sect. 49 On some Gen. Properties of Metals

Besides what we said of Mercury there is another method by amalgamating it with Lead & oftentimes 15 or 16 times this Quantity of Mercury is said to have operated Effects. Farmer orders the Principle use in his Pond Globe made of this Quantity of Mercury.

We come now to some Gen. Properties of Metals.

1 Their Calcination & Exposed to Heat they change their form into a form of Earth called Calces as for instance Even Gold itself.

The difference between a Calces & a Metals is that a Calces being fused does not mix into Metal again but a Gold tho' some doubt do so. Gold for instance.

The change of form in said Calces & Sep. of the form of Metal but there is an addition lost Metals of the Calces & Sep. as Lead acquires a Quantity & Iron considerable more with arises & Addition must be very considerable.

The Act. of Air is necessary for the Calcination of Metals as Tin is scarcely calcined, if thus up there will more become a Calx than otherwise. We therefore to reduce metal into a Calx put in an open Crucible & set in the Muffle Out of two a heat in Oven part is calcined & part stearing in Cup. Around they blenbomony for Lead as here shewed, & all lead up to Cup & continued.

All Metals emit fumes in Calcination. The Reason is that this substance [illegible] is probable that this some of the Metal is off. One of the Mechanical Elements some of the Integrant Parts of the Metal may fly to

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And this more evident in Lead in Furnaces and Refiners condensed matter flows Lead; the Lead seems to burn but this Appearance is apparent only Not, and these flowers may again be reduced by Lead, in which that they are parts of Metal & not the Chemical Elements.

All Metals don't calcine by same accumulation some require to be in a solid some fluid form. Some require a greater Heat to calcine or Mercury to reduce them to a fluid form, as Calx of Silver for 24 hrs if committed to a 3d Heat Nr destroy the Adm. between it & its imbalance w it required, & Silver will become of its former form tho it first becomes a Glass. Hence Enamellers never can enamel on plates of Silver.

Iron Copper Regulus of Antimony Calcine readily in a Solid but very hard reduced to a fluid form, if we put Copper fine in stance into a Reverberatory Furnace & not suffer it to melt in the Copper it will be reduced into Calx in flakes, but melted it return to Copper and Calx of Silver did so Also, and this they do in Copper Refiners apply Nr to reduce it to its metalline form.

Mercury can't have any degree of Nr applied in its solid form as a 2d degree of Nr is required to make it fluid. The Calces of Mercury are easily reduced to Mercury hence a partial gentle degree of Heat. We can easily calcine Mercury by putting it into a Vial to a long Tube & round into its mouth & Mercury to be kept boiling in a sand Nr but care must be taken to separate the Calx or else it will be restored into fluid form.

It is said Gold is produced by three destroying methods into its fluid form, & this only to say of this kind of one Metal being changed into another by only Gold.

All the other Metals are calcined by nature in fluid in a 2d degree of Nr destroying totally their hard form Calces.

Gold requires a partial Spherical Nr to be calcined without making it part in a Glass.

[illegible] Metals is [illegible] Nr [illegible] the Metal in form of Calx

The Metals acquired considerable weight this way ~~Also~~
& It is a Question whether some of the Lead, Alkali or Salt does not join wth the metal or this Addⁿ is made by some substance is so subtile as to penetrate into the Glass.

This is not the only way of getting the Calces of Gold & Silver, but can't be got otherwise in such Heat can't be got in the Furnaces by Burning Glasses, Sopp^d Gentlemen in Paris Glass this too is doubtful as the Experⁿ has never succeeded to Glass

Thus Calces will take their Colours & turn into Gold & Silver, & Glass in fact they can be reduced into a Glass, as mid Deper^n of Rich in Fulm^n & Metals of Gold made by precipitⁿ & not Alkali

The most common way of making it into Glass is by precipitⁿ it wth Iron instead of Alkali. The Gold falls in a purple powder & this powder by Heat turns into a Glass. but a considerable Hᵗ is required for this purpose.

Another method of reducing them to Calces is by dissolving them in Acids & letting them stand exposed to Air & not by precipitating them into Substance, this way too they acquire a considerable weight. —

Thus if Metallic Salts of Iron Lead Copper and Tin Cogn^l falls in to Calx & ~~Both~~ —

These Calces of Iron Lead Copper & other Metals especially in the Glass Vessels are of a deep red colour & Glasses all of p^ts deep red and Calces of Iron Metals, Copper a Bluish Glass but if any Alkali or Lead be in the Glass it will be a green, Tin a white Glass or a Opaque colour Silver a Yellow, that of Lead of no colour, but a white Glass or a Opaque, also very hard Glass is made by Metals Hard & Enamel Glass made by mixⁿ & Cake of Iron.

All Metals may again be reduced from their Calces into Metals again by a certain Substance being sopp^d ~~another substance~~ an Alkali by Attⁿ. Some of these are done by Heat as Gold Silver &c, whether Addⁿ is required or not. Silver wanted was reduced from its Calces.

Most of these are sopp^d by Sulphur Attⁿ add^d a Substance wth attracts of Iron or joined Metal, as an Lead which is most probable Lead is the Substance added unto Attⁿ & Iron flies off & leaves the Metal

Air Fixed is not absolutely necessary for this Revival

yet dwell & lurked with it & absolutely necessary
thereto are Volatile.

The fossile Pht. an Cobalto ye wgnt reduce a Metal into ye
form, Vegetable Pht. do whether ye fossile Pht.
appear doubtful is uncertain but is not probable
and in ye Reduction & Calcination happens heat being
produced it wd seem to imply an Active Att. as in Water
for Pht. Hence wd appear that it does an Acid ye Metals
acquire in Calcin. or an Alk. in Reduction.

In ye second place ye Solut. of ye Metal in Acid
is made by ye Alkali in a Close Vessel, ye Metal falling
in a Calx ye acquires weight wch must certainly be an Acid
& there is a considerable obn. to this Theory very Metals
in Calcination themselves may be calcined, tho' ye Acid & acquired must
be bound fixe & not an Acid from ye Air.

Hence ye is rather improbable that Calcination is in Metals
nor is it proved that tho' an Acid is added in ye Calcin.
yet Calcs tho' red and lost appearance of Earth yet
differ from ye in effects as they have ye same effect as ye
Metals themselves.

Sect. 2d of ye 5th Chap. Combin. of ye Metals one another

Have treated of ye Sev. Properties in a mad come to
ye mixing of Metals in one another.

Minutes all of 'em almost dissolve one another but
this Difficulty some Chemists made a perfect
mix of Metals very perfectly. ye Properties of ye perfect
differing from ye properties of ye Components Metals

The Exceptions are Iron cannot be combined with
Copper — nor is Mercury nor Bismuth with Cobalt.
Tin & Lead can't be perfectly combined but upon
slamming ye Lead oozes out.

And same is by Copper can't mix with Lead for ye
Copper appears powdery upon cutting the Copper

(a) and after has stood in a strong Wt some time the two Metals are found united under a Crust of Slag this they make Brass –

Copp: of Neut Lead not and: its fusibility, melts before
& Copper houses out in drops. These are only onto that
is to mix & shock do mix imperfectly w: one another but
all & other metals mix is one as flus & Crumpt: into
malleability & other properties differ from metals & compose it.

There Mixture have obl: diff: names. ex
Amalgam: Mercury with Amalgamation
Copp: w: Lead, would Pinchbeck & Prince Mettle
Copp: w: Calamine, whole Copper is is sold very dear.
Copp: w: Tin, Bel-metal
Copp: w: Zinc, Brass
Metals are seldom solid unit: upon one another
with: of Neut: but some stem are usf: to Calcine
or and more volatile, there is the most difficult fusion
is therefore Golds heated here & other Metals warm.
Rep: inflammation mercury melted other metal first
However is generally in mind prevent & Calcination
by excluding Air with: which they don't Calcine
In mak: of Bell Metal neither Copp: nor Tin are
is calcined or one happen volatile hence we put in together
into a Crucible & fire sufficiently promoted fusion of Copper.
As can inclined where of one is easily calcined the:
Copp: & Zinc mak: Brass if Zinc is used was carry
volatile to prevent this recover upd Metals to prevent
acc: of Air Physic: does common sell: with some Crucible
& prevent Calcin: off Zinc, shut & Crucible would
do but then 100 should be obliged to calcine together of metal.
In mak: Amalgams if Surgery of Mercury burn
fluid cuts upon Metals as a Menstruum, as Gold or Silver
added in hot Mercury dissolved, however if metals is lower heat
if & Mercury added, after Mercury was heated to sat: sometime
it would fly off from the volatility
Rep: Mixtures here added that Gold previously heated and
& Gold fluid heat: greater vessels than & Mercury had before
& Thus is common way of mak: & Amalgamo of Silver, Tin
Zinc Bismuth & Antimony is brittle.
which is particular if a perfect solid: is made in these
yet if more Mercury is added than just suff: to make it into
an Amalgam, & Mercury will run off & may squeezed thro:

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(a) hence Archimedes's rule of distinguishing of
2 liquid specific Gravities applied to gold & silver 10 to

tho' a Cloth or piece of Leather & Quicksilver most perfectly
liquid Mercury may be separated from Amalgama, but
Mercury in general gives some of the Metal hence never
to be perfectly purified Mercury.

Tho' Mercury mixes easily wth most Metals & Semi
metals, yet it wont mix wth Iron, Manganese, Regulus
Antimony & Copper, requires a peculiar Inchemisco the
reason of this is, it wont mix wth any Metal that is calcined
the Regul & Copp^r are easily calcined. & the Copp^r requires s^ch a
wth wth volatilege of Mercury

The Method is thus Take then Plates of Copp^r & dissolve
them into a Solution of Mercury in Nit^r Acid the Acid coats
off & Calcined parts of the Copp^r precipitates & Mercury
wth them behaves into ye Acids off the Plates. & we get an Amalgam

In order to Amalg^m wth Antimony or more Regulus
wth a considerable Possibility wth ye add of Vegetable Water
& then Mercury wth easily mixes after Acid has cast off
& Calcin from ye Regulus.

Hence now ye Qualities of Mixed are changed
from those wth compose'em wth thus

They generally are harder, as Tin & Copper make
Brass wth is harder wth Copper tho not so hard as Tine.

Sometimes ye Mixture is harder than either of ye Metals
as Pewter harder than Lead or Tin.

Generally they are less malleable than any mixture
but this is not always a general rule as sometimes a
copper bulla gold as pond mature of Tine & Tin
as they are hard as they are much more ductile & yet
of greater specific Gravity than any of ye Metals from hence does not
assure us to tell how much of the Metals lost in a mixture
by a specific Grav of ye Mixture. The only way is by making y^e
Mixture & comparing 'em (:)

The Metals generally in Mixture are generally more
easily fusible & this more y^e in prop^n to ye Quantities

Bismuth is easily fused & yet Bismuth Tin & Lead are as easily when combined as from itself but & other alone are much more difficult of fusion — The proportion in the mixture is. Bismuth 3 Tin 2 Lead 1 Antimony & Mercury is added it is so easy as to melt in the Heat thereof boiling Water some have proposed this for an Allowance Injection

The Parts & Ductilness of the Metals & their Properties

Gold contemporaneous & most perfect tho' others are as perfect

Its separation & wed & Strength of pure Metalline substance except one Platina viz the Heavy of the same, The Specif of Gold is as 19 to 1. It is often reduced to Malleability may be extended 1 gr over several miles of Wire & Boyle is of Record possess of pure Metals so that he could see Silver wire thro' it tho' so much extended.

Gold is malleable both when hot & cold.

Its Colour yellow but may be made more or less pale by different processes with the Allum the mixture of pale Evap Pro of Antimony makes it a bright pale red.

Its Salts & Gold in its Solution makes hey & Salt colour contrary to other Salts

Is a Dissolvent whether its soluble and Dil. Acid but improbable it may a mixture of Water

Also not soluble in Spt of Nitre & Gross Acid but may in both together which may be called Mercia of Gold Cast Net Acid at least in Spt Nitre off hence Molecule bodies apiolid Solut. & Spt of Nitre Acid powder of Gold

It may be gold powder and Lay Acid by pouring to precipitate Sweet Oil & Alk. in Acid Fall Mixture are Also Soluble in this Acid

One Precipitate is made by Oil of Alk. & exposed to Spt Sols off is a Phase hence called Aurum fulmen but Precipitate is fixed Alk don't fulmen are Glass mixed with Aurum fulmen Incremento & fuse in Crucibles by David de Heptulis & Spend together in order to Gilding

The Colour of Glass of Gold is Ruby & that Ruby has to colour arising from Gold, the Colour in

Enamell worthes is made by Gold wth alone not produce this Colour.

Silver is oftenr Spec^ly Gr^ than Gold, also of other natives wrought from its ore also soft & malleable. Its Spec^l Gravity is as 11 to 1, Metals do sometimes differ in their Spec^l Gravity — And its probable Gold itself is of greater Spec^l Gravity when its Crystals are very small

Silver is fusible but requires nearly a white Heat, and Heat it becomes more & more malleable till it comes to a certain d^ree wh^ it comes in brittle powder. It is next to Gold in Malleability & ductility in Coin & Plate

The Solut^n of Silver & Nit^l Acid if precipitated with Vitr^l Acid & Water under wch Silver appears immediately and is hard & all & not a mere Calx.

Silver is easily dissolved in Nit^l Acid, dilute. It also easily dissolved with Murratic Acid and was done wth Vitr^l Acid, the Comb^n wth Muri^c Acid is a perfect Corros^n hence fuses lod Bottom.

Its dissolved and Nit^l Acid by precip^n its Solut^n in Nit^l Acid by means of fixed Alkali, and this joined wth Nit^l Acid is dissolved matt^r which we may call Faolas of Silver Exp^ts here shewn —

The Solut^n in Nit^l Acid hath not been applied to any one. Its Solut^n and Nit^l Acid, fused & then called Lunar Caustic is known in Pharm^y Provides this Caustic in solid Cases preferable to wch fixed Alkali —

Its Solut^n in Murratic Acid, this after fusion is somewhat malleable & of a horny appearance hence called Luna Cornea

Silver is calcineable in Nit^l wch is just suff^t to melt it min^d wth Earth Yet a yellow Slag, but stops better exp^t calined by precip^n. Some of the Colours of Precious Stones have their Colour from Silver but precip^n-

alley from Iron & Lead -

Lect: 51 of Iron & Copper.

Iron another of the perfect Metals was once so rare as of Brass of the Earth the several pieces and Cabinets of Naturalists yet are really not, as evidently of Brass so Iron arising pieces of the Prince of Orange

It is often combined with Sits & Muriatic Acid as also with Sulphur, also with Vitr & Mur Acid & especially in Mineral Waters, but Vitr of Iron has been found Earth of Muriatic seems solid owing to a decomposition of Vitriol of Iron & Mur Acid has greater Attr for Iron & Vitriolic has an mean by a Precipitate and this proves by analysis of Mineral Chalybs Iron is in Min Waters, Mild Sits of Iron

It is also often found with Native Sent Salts as Sea Salt, Alum & Magnesia Glauber Salts, but not common in Earths, is found in Sulphur, as found also calcined mixed in Earth over most Metals of Earth also in green red yellow Colours Stones & Pebbles.

The lower forms always arise from such the forming of Sulph Fadd Phlogiston to Calx. Has in Use in large Works in large Furnaces & Bellows of this form

They have since had Improvements which attract & suffer by an Steel Attr

In this way we have of Iron not so pure in hard Cast Iron & not easily Malleable.

Malleable Bars from Cast in being pure, & malleable seems to be perfectly pure & Crystallized in large Crystals

Steel seems only to get a partial leading from a partial Increase by heating together Bars of Iron & Charcoal & Respectam together: & Bars from Iron is good & harder by cool

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(a) by calcination and is not so brittle heavy & Tenacious stare well without again dressing hence this Calcined Lead is recommended by some to make Crucibles of.

(b) It also to be calcined by forcing off the Lead by Nitr. & Vol Acid &c.

after having stood, if the steel is crystallized into needles
Crystalline. so Glass also does. (a)

The metal wash blush colour, but shall on cool from
not a reddish frost and melting point Crystal. reflect light

Its specific grav. [illegible] 8 as of Gold brass
is total as 7/6 to 10 as steel it is ignited heavier than 7 8
to 10, is not so malleable as soft Gold or silver can't be so
forbended nor is it so close in its texture being easily
heated out into a Leaf

Steel is of hardness of pure metals the some
old mixed are Common in fine tools & Dir, & this
this metal is used for Speculums of telescopes.
Forceps are so hard as to strike fire & flint but not like
its hardness is done by heat & suddenly cooling,
some say said to harden it by slipping on em the dam-
aness steel is to be hardest - ow however only to their
pure figging & not to any parts manner of metal

It requires greater heat to fuse it than any other
metal except Platina & fine metal be nearly like

It is very easily calcined by all the Rod of Calcin
if Exposed to heat calcine as soon as it melts. & Malleable
doomed them of Cast Iron, and melts before any
other, but chiefly Bullets grow tough & soft gradually.
Its tenacity renders it very able to resist Cannon of Malleable
Iron - It is also capable of Calcination by Bracing.

Its of all metals easily calcined by exposed & Salts of
the of Air (b) [illegible] and on its Differ unless
exposed to the Air first. Heated & Mercurial acid
easily calcined in Air, this Salt has a particular mut
[illegible] Nitrous Acid waters calcined to lime & alkali & solve
[illegible] but difficultly effervesces, hence a difficulty of the tests
the salt alkali [illegible] gentle Heat.

Nearly calcined by being exposed to air called
Rust

This Calcination poured by Heat into the cap. gives a Black Colour'd Army that's Colour owing to this. This Calcine and not be restored to Metalline form but by Add. of Phl. & expos. to Fire.

So much for its properties; one however it is peculiar to itself is that it attracts by Loadstone; this in particular no other Metal doth, named the Metals from Mars a Martial Direction one end to North & other to South & being rub'd to a fine sharp edge gets this Property and will attract Iron

Vegetable Acids dissolve it & Vitriolic into Salts of steel & effervescence Nitre & Spirits inflammable Acids with Nitr. Acid makes it dissolve of Iron, but it wont dissolve and Concentr. Vitr. or Nitr. Acid but only when they are dilutes. Nitr. more easily dissolve. Spirits Hom. dissolve my Calcine two Gardens Acid but not so easily in Marine Acid, but Nitr. Acid most easily. Vitriol dissolves it into most Concentrated Salts, and hence has been thought by some only but a Solution but Nitr. dissolve it.

Dissolubile and Precipitated but only when it has been reduced to Calcine. It must be first dissolved in another Acid & precipitated by effusion of Water added. Whether it would be any better in this Compound it has been thought by Chymists as Acid has an Astringency.

Some Salts are more of it than the other some are Calcined, hence more may be expected from Medicinal Preparations of Iron in Pure Water.

Dissolubile and Calcinable but insoluble, Stomach and Fried Alm. & they must be in Calcine here also

Vitriol also dissolve small proportion of Calcine, but not so easily as other used commonly for Medicinal purposes

Insoluble in ye Expressed Oils by fire becomes rust from the Acid adherent to ye Oil. this proves that Lead is not Spec. Chem. adherent. & forming Oils to preserve Iron were not prepared Oil by boiling Lead or Litharge with Oil

Lead not so soluble as any metal plus of Lead boil 3 degrees boiling water. If this is of any use in medicine vary boil carrot medicinal compound in Sulphur and Oil or Lapis Armaletto.

Armaletto wch called ye Metal last Copper & Tuscany white Lead & other semimetals is inferior

It anules in Earths if prol calcined & makes ye Glasses

The medicinal Preparations are as follows

Given in fine powder in ye filings mixed with Acid and stomach. Stomach purged afterwards Chera

Given next given in ye Oil of Acid in Oil of Iron & ye Muriatum Phenol Water &c

Harlem given and form of ye Calces either medicinally precip. or fresh or dry & ye Calces by fire as Colcothar.

Thus to be remarked that ye Calx by precip. & mol easily dissolved in Acids & Iron & more proper cure.

Lead easily dissolved in Sulphur

Copper another yet a fusible metal dissolved in Sulphur form but only a slight precip. but Iron bring ye ferment in Copper

So ye offendi holes bid Oil Lead made blue Water this is due decalo ye Iron dissolves Water probably from Copper unite ye Acid found by Pyrites and Coals & Earth, the cause of Copper from Iron by throwing in bar of Iron, upon Vitriolic Solution & precipitates ye Copper & is not Iron changed into Copper. after form a Crust of precipitates & inner part long Solution & filter upto order & so on this way work by bitter

741/a. 1 ye Prince Rupert not to be in Ireland

It is a subtle Observing that plants by Fire
This is in form of Calx, and Gross Sulphur Arsenic & Salt
& Sulphur is forced off & the remained Copper to its metalline
form after that it has been made into a Glass subtile is little
short of a metal exposed to the action of Fire
more pure & malleable —

Copper & Iron gotten in a perfect metal & dissolved
Also colour may be changed by Cementation & Mercury
& many other of Mercury & Gum Cementation & Mercury
colour Copper Gold & silver but not Cementation other properties
in Cementation as by fixed & hold Mercury & wind & water

This Metal more soft & malleable and Ductile
but not so much as Gold & yet more malleable as Iron
and Steel. It melts in the degree of Heat Iron does yet
more mottley white. Heals & Tempered yellow, white & blue
Spanish Grey & Gold is a g to.
It is easily calcined by Fire into a solid form but not
a fluid form, however exposed without fusion easily
calcined into a black Powder & make the black
glass.

It likewise easily calcined by Precipitation
Also by exposing it to Solution & Solvent.
It also like Iron may be calcined by Fire exposed to
Air alone when Air moist especially, but not
the Calx capable of Vitrification but not so well without
the addition of Fluxes Borax & some sort of Vitrifiers or other
Metals or Borax, & thus gives different Glasses according
to the different Fluxes used.

The Colour of Emerald or Precious stones
These also may be added and Copper by applying Fire
alone but sooner by adding Sulphur. This Gold & Silver &
Mercury are only some capable of being reduced from their
Calces to a metalline form without any Phlogiston added (a.)

7483 Novella Venuda: Inter Antonio & Bartolomeo di Maffio Grandi, ad Conto fallacioso.

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As we have treated of the properties in Genl we shall now come to the Solution and Acid

Copper is most soluble of all the other Metals in the Spirituous Menstruum

It is soluble only by the Spirituous Menstruum

In the Vitriolic Acid it is produced into Salts, or Vitriols exposed to the Air, this Solution in Copper that its Solution in Menstruum exposed to the Air or with the Acid, as the same upon the Air excluded no Solution takes place

Volatile Vitriolic Acid makes a Solution not required in Medicine

Dissoluble in the Nitrous Acid but not by Concentrated indifferently applied but it will be exposed to the Air but that Solution takes no more a month

But if we first dissolve in the Vitriolic Acid for add Water therefore if the Vitriolic Acid be first used in cleaning Metals whether these Solutions be observed in Medicine or not

Dissoluble in the Sea Acid by Acid Preparation Rather by having any up of Copper by pouring of Lead Vapor and the Lemonade or Dissolve Acid. The Crystals of Verdigrise Fudge dissolved into Crystals

It is totally dissolved and Not totally made of fine Blue Solution but the Salt must be exposed to the Air many of the Phial is done after Solution and Copper is precipitated Stand a Considerable Precipitation

It also soluble in Animal Spirits and Volatile Salts as was to find out when Copper is dissolved in any by adding Volatile Salts it takes of fine Blue Colour

Lime Stone is soluble in the Acids but not perfectly of their Adherent Acids

Dissolve also soluble in the Salts as Salt Commonly and must be exposed to the Air

Dissolve soluble in Sulphur especially Copper It will not dissolve unless with an exposed to the Air

It capable of being united to Gold & Silver & exceeding it self. wrote said Geoffrey & turned the more than any other Metal on all sorts of Colours & made a hard Mixture

It will be burnt with Camphire but exceeding Green & Black the Green dow this also, but the Copperis notwithstanding changed

Its solubility and its Fixedness when exposed to Fire made the particular Lately tried & Jewels were burnt by powder & being dissolved in it & also covered Water. This is produced in the Calx of Copper. However it is not soluble in these waters, tho extend long in it & even Vinegar & all men wt how harm be could imbrace Jewels if & Jewels are Clean & no such appearance in the water spoil it

Tho at present noted internally & Externally is in it Blue Vitriol & Verdigreas. The Calx used by Water has been used more for wie as a Diuretic, but is now not much approved of by the Faculty

Van Swieten mentions one Boerhaave n° 1000 with was sweat & Astringent — And it is not certain but it was whether it might not be a deception —

Chap. 51. of Tin & Lead

We come now to Tin & Lead

Tin another of the Malleable but least Dural Metal of any of them. It never is found in the Bowels of the Earth tho it Dalmatia also to say it is but it is not in Europe. Tho it may perhaps be found Early Indies their Fri heard no Ancient

It is never found Corn'd with Sulph. being insoluble in it nor is it found united with Lead hence never got in Mines Veins

It is generally found with Arsenic & make therefore of Tin so much greater use Gold than of other Ores

This sort found Arsenic by Reason of Arsenic being volatile flyes off leaving a Tin or a Silver to be melted with phlegm into Tin Gold is never thus got since of a Revenue but is easily capable of being changed into y Metalline form by Mr. Chancellor Wolf thus combined and not so Volatile. But possessing off of Arsenic in a best Way of Calx in gold Ores from Gold fetch Arsenic with Metalline form does not of Poison form.

Thus got in Metal of whatever Colour, of the Lain Sheers of all perfect tho not of imperfect Metals dissolves as little more than that Tinc is only got of greater Good off this may be our long Revenue

This called Metalick Lead Malleable Range near of Seem's a Semimetal when Cast out has a perfect Crackling Noise. It shews its Difference from all other Metals, all is of basis of broke of other Metals

It melts before it becomes red Hot, melts sooner than any of Metals except Lead, It is also the softest of them all except Lead. tho this soft itself hel mixed w other Metals hardens a m. of Copper makes one harder than Steel Lead of Greater Colors used on Speculum.

If this melted & exposed to Air in open Vessels is easily calcined into a White Powder the Arsenic is thus forced off leaving Volatile other reduced to Calx

It is also ~~[illegible]~~ exposed in another Way: by by Mixing in a Mortar & stirring it with Vinegar & Tinnefe till it is again exposed to Air only a part melts y other had before been reduced to a Calx

Another Way is by throwing Sublimate Boric Chalch they is not get a part in Powder but rising not so much calcined because of former process hence not so good

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It is also capable of calcination and other metals by precipitation of it insoluble by an alkali or calcined earth but not by any other metal.

Also it falls off in the lead is soon calcined and exposed to the air. Its solution is employed as a wash for

Pure calcined lead & its oxide are melted into glasses this one is a white colour. It will hardly form glasses of the metals & more difficultly of fusion joined with a little arsenic & shaken in

Discontinued use of the Litharge & those Colours are every but

As this easily calcined so is easily reduced by a dim or by the Phlogiston & shut close thus observed that we do it was necessary that it clear from the arsenic that it be so hopeful & not also to the metallic form in it is fine yet it is this commonly in the shops in the form of a cake

It is probably the Calx of tin which deposited in the stomach kills the worms.

So far its properties now as applicable to other substances.

It soluble in concentrated vitriolic acid one ounce of it heat this of pale salt which is decomposed by pouring on fresh water which we don't understand

It is also soluble in Nitric acid made a fine but calx not soluble in water it raised by the fumes as arsenic

It is also soluble in the Muriatic acid appears more strong than

It is more easily dissolved if it be mixed with the Muriatic acid & this easily & soft so made the

It is insoluble in Nitric acid but by over heat & water hence this salt is the same & made of the

It has been long most reasonable for the basis of salt metals but if Nitric acid dissolves it from the

[illegible]

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It is also capable of being united with the Vegetable Lignum
Calx this Salt is different from Nitrous Salt: easily runs into a
Calx yet is insoluble in Water.

It does seem to be soluble in very quantity in
Alkalies and the Salts hence not so in Dain Water.
as much Circumstances want therefore of as is necessary
for the Solution of Tin.

It is a Question whether it might not be proper
in Bile

It not soluble in Sulphur or Gold Platina Earths
are not It unites with all Metals. with Copper as it forms
the only Preparation used in Medicine as a Calx as an Anthelmintic The other Preparation is of Saffron now laid
aside It was a Dispute whether Tin could be dissolved in a Very Acid Menstruum however it does and Tin is in Calx
& Acid Concentrated should be made in hymn where
it can Evaporate by the Heat of the Weather.

Tin is of most useful of all Metals for Medicinal
purposes Its Amalgam by Mercury is used for Gilding
Slates Tin Leaves are used with Amalgamated
Its greatest use is in Dying all Colours being produced
by the Solution in Tin Mordant and especially the Colours of
Cochineal This has been accounted for by its insolubility
upon the Supposition that all animal fluids are
coagulable by this Menstruum and Cochineal are coagulated
also the Juice of the Tinctures in the Cloth Woolen &c
which are the only ones fixed by Coagulation. no Vegetables
will be coagulated thus

The Indigo is fixed by the Bulb lye Alkali.
which coagulates the Indigo. as Alum & Metallic
Salts Do

We come now to Speak of the Last of the
Perfect Metals.

Lead ye also are in the Bowels of the Earth & in Veins
in Stones & in Mines but in precipices & Waters
It is not found pure nativous combined wth ye Acid
It is also always wth Sulphur never wth Arsenic as the
Inferior metals & particular are called Galleniers wth other
metals & are in Diff^t forms
It is generally always in the Works in much such
a furnace as ye Dross. ye Slag Roast is then thrown
into a furnace wth Charcoal, & Quicklime or Iron
either of ye Allroast of Lead & Lead is metallized by ye
Sulphur
A Dr of Silver is generally got from it this
always with ye Lead & may calcine the
Lead. Its colour is blue almost like ye of Iron
Its specific Gravity is next to Gold is 11 to 1
It is softer & more easily melted of all ye Metals
is easily Malleable, yet not so as Lead
some of ye Semimetals as Bismuth melt sooner than
Lead It is one of ye Metals to be easily calcined.
after melted. It is easily Calcined by Bullegi^n also
by Burning it Salt
The Calces have Diff^t Names
as Calcined by a mild fire it called Litharge of Silver
of a Greater Lith of Gold of a Greater Burning this
is done in furnaces.
Another way is Exposing Lead to ye Air & this way
we have Ceruse & Verdigris & Vinegar or Oxides of Lead.
It is easily reduced to Slag by a mild fire & whose
Slag easily melted from ye greatest Power of Vitrifying any other
Substance also of all Substances ye Slag of this is most
Simple Hence ye Chemist find it difficult to get a Glass
wch will hold at Short Burning Vitrifying Vessels & it takes Pure
Poses

All Pearles recent & Diamonds have their colour from this Tax mixed in Earth.

It gives a yellow Colour to Lucarto

It is most easily reduced by the rays of any metal into pure piece of Gold into Charcoal & Lead is esp. by Globules produce in Crucible of Vapr. ~~expert~~ Charcoal cannot to penetrate it

It is applied to other Bodies.

It solution in Vit. Acid into a Corrosion of most perfect mind not at all soluble in water

It easily soluble in Nit. Acid without any degree of heat & makes a pearly salt of a yellowish Colour

It is also soluble in Muriatic into a perfect salt but not like this first dissolved in the Acid

The solution of Vit. Acid is precipitated in a white by add. Vit. this called by Chymists the Mercury of Gold hence they said Gold contd Mercury

Also soluble in Ley Acid into Sweet Saturn made by the appr. of Vap. Vinegar in Holland.

This soluble in Rich has but in small Proportion but not at all in Salts

Also easily soluble in all Oils except Olive it is too volatile

Also ~~dissolved~~ Malleable in other Metals & in Earths into Glasses.

The Properties in Medicinal Purposes are Calces & Solution but in Mechanic Uses Metalline form

We come now to Semimetals as they are called tho properly as perfect Metals are Malleable Metals & differing from Earth —

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Semi Metals differ only from Perfect in not being Malleable.

They are of Zinc Bismuth Regulus of Zero — of Antimony Cobalt

Zinc or Spelter was called when com from East India called Tutenic

Tinol so into Brass and Borax and Earth being to Calx. So and Sal Vitriol Acid mixt of White Vitriol which is not original Metal but by Zinc decomposing other Salts. hence so in of Salts of Iron & Copper which are often contained in White Vitriol

This ordered from its Calcs by means of Lead which Phen. & Thus in Copper Vessels open one wise easily calcineable hence wrought to Calx again immediately Therefore in order to have of Zinc pure from its Calx is of Lap Calaminaris, we expose it to Vitrification

Iron Pure is of most Malleable of all demi metals White Bitumen hence found most part Shining of Blue as Astringency of Brown Both join

Antimony doth agree with other Metals very much in Colour. in its properties.

Specific Grav 6.70 and 6.6 of lightest of all metalline substances

So also hinders all metalline substances Iron. of make upon Brass a hard Metalline Substance

The Hard yet is not Brittle —

It is fusible in a Fire it is not sufficient to make it red hot but if higher is of most easily Calcined its Lap to appear it of Burning

Part of this Volatile and Lap Co. Sublimed exposed to Fire is not Volatile

It may be calcined by Saporing its Salts & Reverberating Its Calx may be Vitrified contrary to Author but this only with of most evidence Vitrum, white glass not in any of Brecciays Stones

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It is most easily soluble in the Acids of all Metals
with the Vitriolic Acid in a Mild Vitriol when not
quite Inflammable Sulphur.
With the Vitriolic Acid is also Dissolved
With the Muriatic menstruum of most Regulus of Antimony
substances not to be Acted on alone
It is easily dissolved in the Nitrous Acid & red acid by
Cube. It also soluble in large proportion in the Volatile
Fixed & Fixed Alkali
It is also soluble in the Salts hence Corrosive
Waters probable, as it can be united with the Vitriolic Acid
& Nitrous & Marine Salts
Whether Aqua Regia dissolve it is uncertain
It not at all soluble in Sulphur
Insoluble in all Metals
It easily Volatilized in Water in a Calx.
Its preparations in Medicine are Bezoar Calcareous
Vitriolated in the Vitriolic Acid have been used
as an Emetic Purgative, & not otherwise affect the Stomach
Lead & its other Preparations and Salts Keep Cathartic
The Filthy & Flowers increased overing formerly
The Lapis Calaminaris is of Natural Use & of
Antient. Whether its other Combinations might be used
in Medicine the probable has not been tryed.

Sect: 4 52. Of ye History of Semimetals.

The Chemical History of only two of ye Semimetals we will mention.

Regulus of Arsenic is only called so to be met form of a Semimetal & not

Arsenic is generally met form of a Calx or combined in other Metals & Metalline & Sulphur alone. It is get generally from ye Domestic furnaces where other Metals are omitted & concentrated in ye Glass Sublimate is then got in Shops. The Sulphur flies upon it & if there be inconsiderable quantity becomes yellow. - The ev'ry Calx of Arsenic partake more or less Arsenic combined in some degree, it is not insoluble in Water tho' in small quantity yet unfit to poison.

The Calx may be reduced to ye Metal again by adding fixed Alkali. It may be done in Florence Flasks in a little Oil as much as moistens ye Arsenic, & another flask is to be placed on this & ye whole applied to a Sublime Apparatus & a considerable Fire to be applied. The Phlegm probably separated decrepitates in ye Calx or ye other substance that it is applied to. The Arsenic sublimes into the Flasks & becomes ye Calx or ye hence black, but solute not Reddish.

It may be easily made into a Metal. This no doubt Dec. & if joined to Lead probably ye same to happen & this might be made a good Medicine perhaps. but yours to Copper makes white Copper resemble Silver.

Is capable of Solution and Hot Acid soluble in Water in a good Vinegar if we should apply it to Medicine perhaps but however we dare not venture upon it.

Some of its Properties have been proposed internally in Cancers & Externally but all these were only Calcine

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Bismuth has been called by Chemists indifferently
known to be a simple & not a mixed Metal.
It is never found other pure and so needs off dross or dis-
colored in many of its ores notwithstanding the special kind of fusion
It is found united wth Cobalt here found into Ores
It easily reducible from its Ore by Charcoal & fluid
alth wth alkali & Sulphur.
Its specific gr. to w^t 9 to 1. It reduced soft &
Brittle. It cannot properly of all metallic subst
long before ignition & immediately calcines & to Calcine
soon turned into Glass. Its Calces may be reduced
by addition of phl.
It soluble in Nit Acid its salt is to be decomposed
by pouring on Water alone, this is some measure soluble
in Vit, Calam & of Vit precipitates it. numerously
and form offalts.
It also soluble in Mur Acid also decomposable
Insoluble in Mur. but only by detaching it Nit Acid
and Evaporated gives a salt - also decomposable in W^r alone
Hence Bismuth not easy to be used internally has never
been used in Medicine and will be difficult to get a Proch^n as none
of these salts wch do exist they wch be decomposed by Water,
and therefore to be rejected wch make an off salt wch by Acids is
not determined.
It is easily soluble in Sulphur mercury its Ore
This also therefore known of its Chem or Med Properties
the Precipitate or Magistery has been used.

Cobalt is found always mixed wth Sulphur not
known to be Sem. tho' lately always found form of Glass
Ores found native here, but combined wth Sulphur &
then not miscible wth other Metals Smalts
So called mixed wth Clay mercury & Powd Blue
Colour Glass to Cobalt
Is easily soluble in all Acids on to Salts
retain its Colour. & changes its Colour by Ph into a

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a mixed by becomes yellow
Green hence called Sympathetic Inks.
This happens also in most Metalline solts & becomes blue by heating. For this purpose Acid should be perfectly saturated.

Platina also lately known, has been much considered as to nature & Gold rather scarce but discovered
It never so united to Sulph. and Acids and Gold
Earth not being capable of such honor.
Always so in form of grains or sand hence
wanted spoil other this a metal
It not being fusible alone; but is in other Metals
into specific gravity matters to Gold-ink as no subst
but metalline mixed w. metals, that alone form
the ~~to~~ dow when they are in form of Glass
It is probable that Sulph. Ar was applied it ought
be fused It is so Malacca East & West Indies, and West
its Mines are shut up.
and East Indies that Mines ~~[illegible]~~ consist of this principal
Metal Gold. Its specific Grav is next to Gold but not
quite so much as Gold. Gold mixed in Gold increase
its specific gravity. The Gravity of Platina is
as 17 to 1.

Chemists have said if they good get a substance
equal in Gr to Gold this be Gold itself if proved not
value as Gold differs from all other Chemically
I not easily sep from Gold because not calcinable
but by precipitate & this Calx may reduced by fire
alone & from Gold round it & this doing hence rarely not
be sep. The only way is to dissolve in Aq Reg & add
Ether.

Reg of Antim: & Mercury this Chym Death
be not known & we should pay poor & regard them as they
are used in Medicine.

76 Obs. The Regulus is got in greater quantity when Iron is used, not so much because part of the dross may be deposited in the Regulus, as that the separation of the Sulphur in making the Iron attracted some part of the Regulus —

Regulus of Antimony is also made with Sulphur never
into a Calx to combine with the Acids.

Stones are then & Antimony itself often mixed
with much Quartz, & sometimes with Crystals are
also thrown away.

It is easily sep^d by the Regulus from its Ores-Vis
easily melted & runs down into Inclined Plain & is then
poured into large Cones as we see in the Shops.

The Antimony in this way contains sometimes more
sometimes less Sulphur.

The Regulus is also sep^d from Sulph^r as we sep^d
Lead from its Ores.

We take 2^b of Antim^y & decompose it by an
Alkalive Alt^n add a Substance wch has greater Att^n for
Sulph^r than the Regulus have are fixed Alkaly & Iron
& Antimony being made fluid the Regulus is seperated
this is kept in the Shops under two Names. Spiculum
Stellar Regulus, wch are the same only if too much
Iron is added parts is deposited in the Regulus.

We take 3iv of Antimony & 3ii of fixed Alkaly
beat them together & put them in a Crucible Vesuvius to a
fire sufficient to melt the Antimony add three times an Effervescence
begins as soon as this is over we are sure the Alkaline
Att^n has thoroughly taken place. The Regulus falls to the
Bottom & the Hepar Sulph swims at top.

In the same way it may be sep^d by Iron 3ii (a)
If we add only a small 2^b of Alkaly only a part of the
Sulphur is taken off the whole, & this is called
Crocus of Antim^y. So also if wch Iron, only this
is of the same specific gravity wch the Sulphur in the Regulus
wch will be converted into Iron.

As the 2^b of Sulphur is various we must determine
its specific gravity & then know how much Alkali
will be suffic.

It may also be got by roasting either in the form of

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Reg^s or Calx

Thus Gold is, & Brittle when sublimated. It is capable of Calcin^n either in a solid or fluid form

It may be Calcin^d by Drying & fixed Salts^s by Heat

Also by Deflagrating it with Nitre, & a small d^y is used we only get a fixed Salts^s & more not Calcine it entirely

Another way is to keep it in a fixed fermentation is not to be not

It may also be Calcined by Precipitation. These Calces not of proper forms as the Calces of other Metals as they are not soluble in Acids. If melted will turn into a Glass of Antimony & this is soluble in Acids

All these Calces may be red^d by the Vegetable.

Antim^y is soluble in Vol^e Acid but only when Cremor Tart & the Vol^e Alk^l this salt perfectly decomp^d by water nice not used

Lead with the Vol^e Acid makes a perfect Calx not soluble in W^r hence not to be used

Lead with the Mur^l Acid makes a Salt decomposed by W^r easily but is not soluble into a Cone but with the Vol^e Acid either in Reg Reg or a Double Medium Attr^n it makes a Butter of Antimony

Quicksilver soluble both in Ferment^d Vegetable & Tartar, & Metal more easily than its Calces and it differs from other Metals as the Salts^s may be decomposed by the Acids hence the Reg need not be used but the Cor Mart all^n is generally used for this purpose They are to be boiled in W^r till the Colour of Tartar when used & the Acid acts upon Antim^y. It is not to be decomposed by W^r hence the Corr Prep^n for Med^n is all purposes instead of other Acids cannot be used as we said above

This Prep^n is the Emetic Tartar. It is made as other Metalline Salts

Antim^y also soluble in Sulphur & Tartar Alkaline but the last never used except in the Antimonial Lemons

Antim^y

and there is a little Reg. and Sulph. Great Amount

Quicksilver may be mixed wth all of other Metals & in Glass w^th & Earths.

Its Properties are then its Fixed, Reg. Metalline wth Sulph. Solut^n in Nitr. & Vitr. Acid.

Cell.^ne of Dr. 53. of Mercury. —

Mercury fluid in out Atmosphere differs from Bodies in degree a great degree of Cold to make it Solid

Thought to be a Metal & not a Semimetal the Ancients called it a Metal.

It is rendered solid by degree of cold with Sulph. Mercury generally in a States and Sulph. of Earths

It flows run out in a small stream but more Gram^s comb. wth Sulph. in its Bright Native Cinnab. These generally both found same place.

Its Gram^s not red but yet have Concid^le Quantity Native Cinn.

Mixed wth Sulph. it is not Solve made from to Native Cinnabar

Also Sep^d from to Quicks. in Distill^d by Distill. Butt mixed wth Sulph. & Sublime must be kept wth with Alkali & Sulphur as Lead from fixed Alk. Affinities put into Crucible & distill, & put Wood Ashes &c. therefore mostly

We have it generally this perfectly pure but some have mixed it wth Bismuth & then will be very over other Sublimes & distill^d wth is Solve sep^d from it Solut^n by Upper wth it added but Solut^n is Blue but from is unit Vitriolic & Colour Gran

It is then shaked thro Water to purify it from & Copper & Antimony & Arsenic & other Semimetals. Then by the way of no Bismuth or it is sufficiently purified from other Semimetals —

It is of all other Met. Subs. of great Spec. Gr except Gold & Platina have supposed to be in Gold, but we see Platina is heavy but not contain Gold.

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How Sp Gr is to W^r as 14 to one

It is calcinable in more ways than any other Metal, vizt by merely exposing its Surface to Air, mixed Cg also a Crude & Mercury converted into a black powder, owing to the Iron of & other Metals resemble it in this. It seems to be that a very little Air is suff^t to calcine it. Shake it thus seems the Calcination. Boerhaave thought this to be the proper Air but it did not.

It also easily calcinable by Air in broad Vessels & continued long W^t for 20 & Months. Thus goes on best when Mercury is heated to Boiling Point. below & above it not so well. The Calx should be ap^t. often formed

It is said that if Mercury is thus converted impart into Gold as well as Glasses are made for this purpose. Nor seem Magistery was some use besides in Medicine & figure of Glasses thus

Another way is by rub^g for any vitrid Substance into a black powder. This also a Calcination peculiar to Mercury

Also calcined by rub^g W^t a dry Substance as Salp^r & Calcareous Earth or Crab Eyes.

It is also calcinable by Precip^n by an Alkali & thus we get diff^t coloured Calx according to diff^t Acids or diff^t Alk^s, as Mere Precip Fixed but Mercury only diff^t Calx

It is also calcined by exposing its Solut^n by Aqua Fortis calcinable in

It is soluble in all Acids. but in diff^t Quantity

It easily soluble in Vol^t of Concentr^d & Dist^d W^r applied this is a whitish but if brown it will W^r become yellow this is a Salt W^h is not as some say perfect Calx part being soluble in Water. If sufficiently calcined is white but W^r makes it yellow. If Precipitation of Particles is soluble in W^r by fixed Alk^s. we get a Mere Precip Fixed. This probably when white or yellow is Properly and Same

It easily enough soluble in Vit^l Acid rather in Nit^l Acid or pretty easily resembling Oil. Acid however is required

If this filter'd thro' and have

Vol. 5. 2. a volatile Salt however thus ordered to be calcined into as probably they imagined it became milder. if long calcined to become odd called Red Precipitate

It may be also precipitated in this solution by Vol ordered Acid Alk then gave dry collouring Calces. Mixt of Ins Alk is yellow called Spiritus Precipitatus. if pr'd Vol Alkis ~~Lynch~~ is called Pure Red Calcedony

Thus deprived Vegetable makes red Precipitate by precipitating into a yellow or Blue

It may be deprived and Mercury but not be perfectly deprived unless Vol or ~~Volatile~~ Acid & then decomposing by a double elective Attr. this ordered and Dispensatory Corrosive & Nitr Acid & Muriatic by their Salts but this may be better done by deprived & prolonged Vol then add & Muriatic pr'd precipitated in a white Powder. if Nr is applied the superfluous Acid is forced off & Mercury being then & Salt or is left in a white body. This better than rubbing & Mere Second Dis

This Salt differs from other Salts in being Volatile & incited by Muriatic Acid makes all & Salt Volatile & Vigeneral Clay kept in & formerly sublimed & called Corrosive Sublim

It may be depurated Sublim'd ~~may~~ be calcined & by many subjected pure Dulcified Calomel

It may be precipitated by & Fixed Alk into & pure Precipitate Blue by & Vol Alk into a White Precipitate called Mild Precipitate

It is soluble by applying & by Acid Salts Calces but not been considered in Medicine

It is soluble in small Prop'n and Alk is precipitated by & Alk generally part deprived

It is not soluble with N & Salts.

It is soluble in Sulph'r either by heating alone, ~~Sublim~~ mixt & Cinnab Nat. & Mild mixture Ethiops Min. Fire two, can have no effect on & Body absolutely is insoluble and fluids, Acid Sr & Calc Earth as in Mere Alk may have effect.

It may be separated from Amalgamed with Metals by rubbing with Leather

It may be reduced from its Calcs by the action & being very volatile cannot be verified but comes over pure & fixed as before.

It has been used made of divers various forms simple form & in its Calces & & between deep effects accordingly combustion. It has indeed with the Dissolvents & Acids alle solution and Burning many more Causes

All these Substances may be reduced to a fixed head of the Crude Mercury which can have no effect on the Body as insoluble in Lye Acid but may by the Menstrual Prot be made into an Ethiops and Calx.

Its Active Calx made by Nit & Mer Pre Fore & its Calx by reduc in some viscid Substances have dissolve as by in W & hence have considerable effects as alle may by Exposition also lies considerable effects.

Ad 3 The Calcs W are not Active but exp Clear being made so then are of Calcs precip clear but Alk then volatile may by Acid sometimes meth in bu Stomach thus not Acid preparations cannot ascertain W as will Acid fixed & Acid varying

The other Class is of made Calcs W can's be made Active therefore of Mer Alk Alk mus get Mer by red, Ind Mercs may some times prove Active

Next Its Solut in of & Acids all these very active & Prep in action made Ques being all soluble in W. Act all of same extent W regard to degrees of strength & Menstrue most Potent Nit & Vog Lyt

Next its Solution in Sulph: W can't be volatile in W nor decomposed by any things in our stomach hence lean hence no effect.

It does not signify what are of Preparations of Mer so long as they are not active.

Effect of the Fluid Prop. of Metals

Stone have very Effectual in Metalline form only on
the fluids solids or stone p. till when dissolved into
Effects by acids alkalies or salts or joined in Vapors
Sulphurs. The Effects will be breaking of Metalline
Salts & so the Fluids convertibly Metalline Salts
imposed solids & fluids are the same Effects differ
only Nervous powers.

When applied to Solids prove astringents to that
particular part & this very powerfully.

This differing thus so that you wd very some were
not astringents but Discutients and Causties wd make
Sense but then if diluted will be astringent.

Applied to Fluids of the Body coagulate acid & Coagul
the fluids. The Sublime wd the accidentally diluted
still retains its Qs.

When the Mechanics began to set into Physic all
Medicines were Chemical acids said to act Mechanically
and that acids were sharp Sharp Salts to sharp particles
Nitre & Salt of Tartar Alkalies & Borax were not
sharp but blunted. Hence every Chemists can't be
ought to strange Ignorance as merely Chemists act upon
mind as their Thoughts.

They also said no Medicine acted Chemically but
concluded as Metals have great effect & they do sharp
a Metalline Salt so be an attenuant of the Blood. but this
was neglected by the Chemists, as Metalline Salts wd
shrink & be thrown into Blood form as Concretions
they do out of the Body. They then said perhaps the would
induce effects on Humors they have out of the Body.
but upon Experiment found. Veins of the Blood coagulated
so as to stop entirely the Circulation

They then said that the Stomach wd make some alteration so as to take off their Bad Effects the Grains given into the Stomach that Astringency prevents the Salts which don't take on up particularly Mercury & Iron as they are very adstringent cant yet now proved enter into the Blood.

Suppose a person take even a grain of Corrosive Sublimate for Phthisis hourly effects cannot well in so much as it suppose for phthisis hourly effects cannot have on so much spread whole Body of Blood.

Hence all the Calmns of Salts Salts are upon the Solids & not Alternative of Blood

Those whose Astringency are greater of Salts a little are Caustic and Corrosive & Corrosive Caustics

Those are their Opn on a Dead Body

Are Corrosive only on a Living Body but differently on the Nervous Syst when they are resolved into Heads of Stimulus

Astringency & Corrosive of Mobility in Muscular parts arm & Legs & Skin easily applied on Inflamed part. a Gangrene may be brought on by Inflamn continuing wd cause Mobility & would have brought on Suppn

Next their Strengthen & Hold & Hold & destroy Mobility and Fall off Suppn & Iron wd thus seen Mobility & prevent Spasms.

Chemists have ascribed a Solid Ds Body Salts, as to Iron & Lead, Copper &c this not easily to be cleared up until fixed enter into the Balance of Poisons

Poison any Substance wd cant destroy Body destroy & consume between it & Nervous Power but not reckoned Poisons but only Medicine wd have a power of reducing & common between Body & Very Poison

They may be thus defined of Sanguine form of this we may call true Chemical Poisons. Strong Substances we know of doing this in natural or

or Vegetable Food which are secreting and Secreting
these powers can't be said to be Poisons if rightly substituted
because when they are but only when People lays upon
them alone. Other substances particularly Eatables are such
qualities instead of being Food and afford raw Fluids nourishment
but are Poisons to some Persons that an
other Poison was indeed mixed and thus cause Scrophulas
but seems to take a Direct Poisonous Nature & Poisons
there is a Death in for particular Persons

Another way is when they immediately coagulate
the Blood & Juices which we may say is a Poison to Blood
Serum & Blood & in they coagulate & Poison in the
Brain two of Lactiferous & prevent any thing else from
they also & up all the Vessels they may be said to be
poisons.

Another way is where they dissolve the Parts.
as a Mineral Drink some concentrated Nitrous
Acid. which dissolves Stomach.

The Substances applied immediately cause poison
in many of these ways as if there is a putrid Death
they would rather obviate it

Poisons may kill by acting several ways
and Nervous Power. Some affect immed-
iately Applied to Lungs, and Gas Suffocates or
Stunned in Pits. These can't do it by Fire and by
Breathing alone but by destroying the Action of
Nervous Power of Part and Breast Heart &c

There can't be said to be absolutely deleterious as
if taken in small Qs don't bring on these Symptoms as
small Qs, Drams of Sulphur & so perhaps might
therefore be applied to Opens & Sensibility of Nervous Sys.

Wine Opium held but not if taken in Moderate
quantity

A Medicine may bring on such strong Inflam-
Spasms due to their immediately Stimulating Clap acted Arsenic
Belladonna, Hyoscyamus Opium. Fixed Nitre hull Ly
cinus is evident from the good effects of Enthusiasmodia

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The 3 hundred such unfashionable made Dishes
continued bring on a particular Deafness in the head of
Coming of this Cleep and Cicuta Belladona & nutmeg
Body subject to Inflammation diseases called Dennica &c
Dare Indeamos due Cancers yet more are liable to hulo of
Patient as of Cancers is an Inflammation of a Medicine hand on
Earth. Scrophulous Colics or wise shorted nutre
aldacrid bacchus & a scrophulous appearance differ from
Inflation & calthsale fungi &c

These themselves can't be said to debilitating as they
don't do it in small Dose & the strongest be used to good
purpose.

Such medicines can only be called truly poisons
are such as of Bite of a Mad Dog Whose saliva or any
Injection over a part of the hand Cutis of this body from
a Person on whatever Dis it had been given —

Two hundred & fifty Metals are Poisons and there
any of them being applied would bring on a Disease in the
Hulls of Patients. It seems that there are none nor
are any Vegetables possessed of these Qlies but of Bite of a
Mad Dog alone doubt too have many Horrid Tales
People and East Indies Italy &c poisoned
in this way by Preps of Lead. but it is not Probable
It would be worth while trying whether Men did so upon
Logs & Dogs whether they left any Disposition to

Some have said it was by lead a disposition to
Coagulation this impossible
Some also by induce a fermentation
We would conclude that most of Metals are Poisons
which given in such Qtie as to Irritate such Bad Symptoms as Inflammation and Stomach
Vomitings Purgings Mercury Copper & particular
Arsenic. Hence the Dim of Mercury in Tin alone does not
in low Consequence but does of Throw away other

tensile, as none of these latter considerable Ductile

Hence all the Metals will Kill but not absolutely Deleterious, not but but in ye Quantities

Now their Parts Properties.

Diff Metals seem to have Diff Proportions of these Diff Properties but not produced at all off from one another.

Lead called a Narcotic taken off the Mobility without sensy & Pains.

The Stimulus has a Sparkle part applied to the Stimulated Part. Wet touches. 2 Part of Stimulus

Apt to stimulate some particular parts more than the Rest.

The Vitriols seem to be of that kind of Stimulus & Stimulate a Part Praised an Inflamed Deafness and Pain. Hence Arsenic used in Cancers as an Aff more in that Tend System & not destroy the Mobility

Another Thing is Some Metals have an inclination Stimulate one part of the Body more than the Other This Mercury acts upon the Glands in the Mouth. It can be lick's alternative or thin the Juice, Some said that as it Tests Spirit Gently This Deriv's more Bad but Need Stand that more of the Mercury w: be up by it ye but this cant happen as to Salivation and Bad is Chemical & not Mechanical

The ye seems to have a peculiar power of that the Salivary Glands, is always secreted & no mercury may be concentrated Hence upon it brings on Salivation was evident by the Metalline Vitrum & Mouth long before & with correspond humour we can act when Mercury given in small Doses may be thus collated hence it brings on Salivation. And

It may be well worth trying whether some of the other Metals w not have effects similar on other Glands This is probable that Silver may be ye to have such on the Kidneys And so it might be a certain Diuretic

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The Ds is this Restriction of stroy. mobility from part parts to wh they are applied. Some hence their restriction carried further over the System than others.

Lead has its destroy. of mobility over the System, so prob. only due to Pin. at first. Mercury they are applied to the Liver Intestines falls down to lell before sometime strengthened after this.

This property belongs not only to some of the Metals but also other Medicines as Bark & Bolus Medicines also in some degree. The Power is rendered of Nervous Power incredible to any irritation caused by Custom. And Intermittent is to be to relieve by Custom and to succeed the other at certain periods —

These don't immediately upon Appl. take effect on the Contrary rather increase it at first time, but smaller doses are given at the same time as take off the first effect of increased irritation.

Perhaps of a strong Dose of Bark or a Dose of Lead would be certain to poison & produce a Fever or any hurt. & Patients.

These Substances increase the Inflam. & bring on Suppuration. & Great Pain is happens in Liver Dis. & differ from the Inflam. as brings on Suppur. seem to the rather of accelerating bring on Gangrene.

Mercury has this strengthening Power yet its stimulating material lead in their Inflam. Cases

The good Effect of Mercury seem to be owing to its strengthening & not to its increasing the Evacuations and General Debility always first caused by keep. of the strong.

Here Redness shd. they increase Inflam. at first time yet prevent increasing on. Hence the early use of Bark in these cases a min. & small Dose & Bark Dose over, & Patients usually dying

Strengthening Medⁿ & Astringents often are confounded & some say ye are the same but are really not.

Astringents make the Vessels contract gradually so as to lessen their capacity thence occasion a small Pulse

Strengthening Medⁿ make the Vessels contract & dilate greatly, so that ye Pulse is fuller after taking them as ye Barks, Steel, which have great strengthⁿ Power, hence these by increasing ye action of the Vessels will increase Hæmorrhages is dont proceed from Relaxation or ye weakened action.

Effects of Metals durable Tin sedative and Lead particularly so also Astringent to sedative quality hurts effectually so ye it shall last thro' life & ye Patient never recover his strength –

Copper Astringent but stimulating, is an exceedⁿ strong Astringent so as to prevent the flow of humours to any part of ye body but its stimulating quality ye we cannot often use it

Stomach & height of Inflam^n run on to Gangrene
Hence the use of the Colony method to keep down the
Inflamm^n: but should not be continued to long enough
to prevent the Supp^n hence good effect of Bath
strengthening the Patient & bringing on this Supp^n.

Iron also a good Medicine to Colony mobility consequently in all Intermitt^t Comp^ns & Hypochon: Disorders.

The Bark not even to be given when Hypochon: Symptoms
not when any spasmatic or Body but only Intermitt
this is only ready to Cath^r off the Bark
not from its opening the Vessels more Glandular or
Lucheness of Blood.

Stone have their Effects only when applied to Stomach
which thus aid to an insensible part of Body Oesophagus
to Part affected

Bark can only have this Effect on Stomach
because produce this Effect upon every part this applied
to. His capable of opening of Blood Vessels but
outpouring in the incapable of a Glandular Secretion
but must be received into Glands to produce Effect

Stone of Salts of Copper as well as Mercury have
the effects joined that effected hence their good
in Strangulations and Supp^ns of Bowels; and
upon we want stored necessary hitherto all Part
the Metallic Salts are better than if offered free
Alkali as they bring on second Supp^n & Inflam^n
ion of Gangrenous Parts by remov^g the Glandular.

Hence the Red Precipitate seldom fails of bring
ald^g for proper Supp^n as it is to mild & its impro
dissolvable in Chim. General Albers lay its Effect
alone have been raised when Mercury was not used
internally this a secret by some. Many Albers have
baffled the Surgeons Skill even this has been used
to Contents but alone never fails —

53. On the effects of Copper Gold Silver and Tine Arsenic

No Medicine can operate on Medullar Analeptic cooled Body unless fluid or soluble in our Juices

Air Metallic Salts are therefore Poisons the Indians have no Medicines for Lead but are mixed into Salts they differ according to Acid made use of: for the Metals have a great deal of Astringency & little Stimulus but with other Acids very Stimulating

In regard to Quicksilver & Salts differ but little altho Astringent & all Stimulating

Yet they differ much as to their actual Work Power. These may be regard to Heads Astringent & Adstringent Mobility, Astringency & lastly Stimulus they will endeavour to explain in general yesterday & the last Copper in Copper Gold & last in Tine & other white ones in General, & hitherto remarkable Astringency

Some have a regular dispos to terminate one & other parts as Antrum & Stomach Mercury & Salts Glands

The Astring & Air & Gold have been little used as coloured very prejudicial to throats into a sort of Leprosy effaces cut & Hussorale & Dr. P.

Tin have been used in Medicine & Salts of Tin but hitherto as effectual & Bigsworth were Papers dis General so great a Tonic

Lead also has been used to stop Haemorrhages by Astringent Power also externally

It has been used externally to take off Pain in Tumors but if does not take off the Inflam but only & feeling of Pain hinder Gangrene mortif. & this is not a mere Tonic if as this Metal & a part should be moved then there be danger as in Inflam & if proceed it have brought on Spasms Convulsions & Death. and it may be advisable to use in as Opium as also proper

Yard Lead & Pain in Cancer Cancer and Phisis this are in Tongues in an easy Dispos & Mercury allowable

easy sore. by Wind Caresses not to be used the Worm
Water Crusts. Spill
Hg been used to inflam: small Pimples and
Face but Lime seems preferable in this Inflam: yet
however should not repell'd as often great inflam: are
brought on
Lead has not been much used lately as the dangers
of Poison either seem in considerable Doses or contin-
ued in small ones for some time
Tin its Qualities seem similar to Lead, its
Solut: in Vin: Acid not to be used nor Salts or
Mercurials as they unite in W: but its
Solut: in Vegetable Acid Also in Spirit d'Esprit is useful.
The only Medicines used in Worms. Mica Tartar
Dr Cam's Cantharides yet a small Quantity is sufficient
The Act: in these Cases much disputed abt. Mercury
think it acts Mechanically, yet it can't as Flat powder
would do the same, and we used Chym: Mercury
also, Tin don't kill in proportion well as Mercury
and Calcined Powder of Tin kills better effects than Filings
or Powder.—
Some have imagined they acted by introducing
a Poison believing Worms to adhere by Glutinous
Excretion not easy to imagine how Metals introduced
itself into the Head the Worm with proportion of Poison
Oil would be somewhat probable since Tape Worm and adhere
by a great number of small Points & Acrimonious Bile or
Mucus of Worms. Tape Worm would generally
be brought away, and Acid imagine they Glass Sand or
any Metal Filings brought out as well as Tin such
Stones & Stones Dose well
The probable Effect is then by poison of Worms absorbed
or if not poison yet Worms can't substance we is disagree-
ably to them they fly Vomit. and they often come away
as malice & Effect of Bezoar.

Another Reason for magnesia is its Poison in the Calx of this being soluble in the Acid acid in Stomach and filling in consequent is sordid as not soluble in Acids. The Calx also is poison [illegible] it is Corrosive Jelly or Sticks [illegible] Calx is or some degree soluble in Water itself.

However the this is one of the best Medicines for the Worms this easily given from 5 to 30 grains worms worldwide this Receipt [illegible] Stone head dont soon take brought away by the Patients greatly relieved. The other Worms are easily killed by Ai.

So far for those medicines and Case Now by R or those who have an astringency as Copper Iron Lead. indeed most of the Metals have this astringency yet this would be a strange method can not be good.

Mercurius doubtful whether Mercury & Effects and Juice is good to astringency, Mercurius or any Spirits Fluidity

Iron is y most remarkable of these do an astringent as Alum no doubt but.

Chum its strength Pr is of ye in Diarrhoea proceed from weakness. as in Hysterick Disorders in wh this of the other Medicines most powerful in not only strengthen & Consolidation but Exhausting Mobility, under stay sum, or Spasms, and Pain in other Disorders but y that true immediate unless we are previously acquainted wh of Habit of the Patient & true know Hole necessary Habit we may perhaps even Goods Spasms in Pain in the Bowels &c w seem inflammation to be Dysentery, by attend to these circumstances know Case. Medicine yet there is nothing more difficult than to strengthen weak patients.

This also in fact an Emmenagogue, and also Hemostatic too Quaqui Discharge in to offer heat dry [illegible] other Lust as the Spasms may affect or cause or large [illegible] Pelo repeated made Heads Obst.

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It is also useful in the Gout and Pits, & Palsy depends on a weakness of the Nerves. It is to be used by Drink & Bath.

It is also useful in Rickets and orphaning Poorer has been given in the Case given by Fat Cows in the other Madder Ens Venereis.

The Virtues of Copper are nearly the same as those of Iron upon Lowness & opposite Stimulus

It also prevents the Scrophula & is a good Wash for a Stony in the Bowels

Also where people are liable to fall into Convulsions at parties Dress or Epilepsies used the Bath & it seems to strengthen more but not so well to take off the probably hence motive proper is intermittent yet perhaps rather better in Hysterics Cases, and are used together the same superior to the more of any other Medicines, and at intermediate Hours that time in which it is to be upon Patients

Iron has been used in a variety of Preparations all of them seem to be of value in Regard to the Principal to be chosen as the Scales & seem it better and may be taken to great advantage in considerable Digestibles, Weed not an Alterative or Sulphur, but the Regard in Regard to impartible in Regard.

Solutions are Acid & also good Salts in the Dust Thus they are easily calcined hence taken on this Acid & Solution and Salt but not so good Effects. We wonder to attribute this in Hurcalcedand Spirits & Sempr an Oil. Also in Oil Acid but must be kept Close and Air making it loose its Effects. It is given thus deposited in Acid contained in Wine

Copper had been used by Galen as accounted delicious. Mr Boyle said it proved more than any other Medicine. Van Swieten said he saw a Prep of Copper which had no Stimulus and a great Astringency. He tried it as a Cordial Medicine. It is indeed delicious, it stops no Stimulus of taken in too small a Quantity but

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of the Stomach &c.

It has been farther than any other Medicine tried in the Epilepsy, by Dr Gray & Probably. The Solution in the Sal Ammoniac and Tartar Vitriol of Mr Boyle & Dr Stoughton. Mr D. saw one cure where the Epilepsy was kept off by the use taken in a few Drops

It has been likewise recommended and Decried in Drops. Boerhaave mentions one Case

Gold has been likewise used in Medicine but. unknown but has a great Stimulus & is astringent & resembles Copper.

The next Class are those remarkable for their Stimulus alone as Silver Lead & Tin, they seem to have little Astringency & strengthen Effects when applied internally on Ulcers & Poison

Silver has been lettered with Effects little known Effects a considerable Stimulus as 30 gr. of the Nitr of Silver purges strongly & 100 gr. by mouth in tropical Climes, & it is said fair to be cured & perfect if we may yet found Some accounts handed down.

The Solution Nitrous of Lead has been used with Effects Internally and in Fluxes alone as a Caustic to destroy any inflamed Portion on Ulcer not perfectly appeared Sometimes used to heal old Sores. In these Cases better especially if not Caustic needs with Fixed Alk and prompted Suppr. Effects principally by taking off the Stimulus occasioned by Lead Discharges or other Discharges & Lead to render less Sensible. The Metallic Calces therefore Lead Cause in these Cases, and Nitr of Silver & Bismuth should not be to much calcined lest we drive off the Acid & the Water

Tin hardly was used internally It seems to be remarkable only for its Stimulus & tried only in one Case internally the cream Tartar. as it is commonly called given after taking Poisons, hardly seems to have been of

& other Effects of Emetics, cathartics &c

Has been used to take off Inflamm^n in the Eyes, also as a Caustic, in Ulcers, but not so much as Copperas. Not only Inflamm^n of the Eyes has good Effects, and should be used boldly so as to paint Patients a good deal but Emetics offer defeat Regular Surgeons. Good Blood^n lines best removed by, & strong Solut^n and long and in weak Solut^n & bad, become accustomed, it has no Effect.

Cerussa seldom or never used in Inflamm^n never in Remedy, always bring on Inflamm^n and Stomach &c. neither is this Effect to be very strongly obviated by giving Oil of Vitriol or an Emetic to bring it up. It seems to have no Effects into Mass, form hence often given as a Cir with so many bad Effects but Comm^n Ceruse is a Sediment left in Vinegar & Water Harlem used and Sch is powerful Caustic Caustic touched our hands and may bring on Inflammations and Skin

Another Eye in which Eyes seem lately famous in Cancers which seem to be Inflamm^n & some have perfect Suppt, as Cerussa but Stimulus always attended with Inflamm^n also used This is difficult to be understood, and we have not much considered this Medicine yet it might be applied in doubtful Cases it exposed by Plummet in its Comm^n form of Salts. It might perhaps be better if were dried to a powder & mixed

Bismuth Cobalt & Platina their effects not at all known

Cf morrow Antimony & mercury whose use is very much in vogue yet their Effects are not agreed among Physicians ~~but how they act~~

Sect. 5. Of Antimony & Mercury

We come now to Mercury & Antimony
I observed that all Metals and Stones & Crystals
are reduced to three heads, Strongest, Wingeary, destroy & Noble
Metals Metals seem to shew that universally overall Sepa-
rant Mercury & Antim. & first affect & worst Salt & Sulphur
& third Vitriol

Antimony acts thro principally on the Glands of the
Stomach & Guts also, but has no Effect on the
Blood or Blood Vessels.

It is given internally principally as a Mercurialis
it is not universal but more partial only to Stomach
& Guts. but does not seem capable on acc. of its Implicated
they to be taken in such Qs as to lose get at any other
Glands by being carried into them from the Mass of B.

Antimony or rather its Salts and Tart. has no Effects
all dispersed, and shown into Stomach they prove Emetic
but not immediately and Time does but first create a
considerable Nausea

Tart given in smaller Doses especially if Gum
Sweet it proves a considerable Sudorific but this
seems to be entirely dependent on its Emetic Q.

It is one of the Emetics w. increased, not only Stimulat-
ed the Stomach but affected the Blood Vessels & Glands in
& remoter parts occasioning and carried off Blood attend-
ed with fit acme excitation or in wholly Systemat
and this biological Emetics for to occasion a decay
and the action of this Medicine in Rheumatisms & seem
to follow to the Emetic Q. Tart has affected
& Blood and w. coagulate it.

From Antim. & Tart & Emetic who treat amongst
Physicians occasion a pre universal Vocal. it is in
& most Immoderately used of all Emetics
and is of Use in Fevers and only Medicine used
to bring on a Crisis.

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In Explain a Fever is a sudden Motion or a Motion
Opposite in Contract and small Vessels occasions
more Blood flow to keep and Great Vessels. The deliverin
is a contract and small Vessels to open and Blood runs
to occasion a deliverin degrees in insensible of what
is done or about.

James Powder tho' a Great Proof of Antim use of this
way Antim may be used Safely

The cogg Not fitin a Cause is a Crisis would in the
Contin Fever Nature by dens Blood bad Stomach
seems to immitate this

But this medicine should be given at the time when
a Greatest Acerbation happens, neither is it indeff about
a day in 3d it w Colet given Antim an Observ
of Crises happen on Correspond days are more
Salutary than in other days not to be able Cor Lapses
therefore we should attempt bring over Crises only in
Just days

It does not seem accident that Crises are
to be always brought on Safely this way many are
adopted, but as Nature sometime Crises
Antimony seems to mate the Nature more perfect hence
it may be used and begin 3d or 4 days Hence Vomits
have been attended with such good Effects and begin
of Fevers, assisting Nature to carry the disease in
Short before the next Acerbation. And Antimony
should be always given at Great Acerbation
Fevers have generally 2 Acerbations one about
10 or 20 Clock the other at Evening 3d seems to
be of practick and Antimony given at this time is
of Great service and it is probable by this the
Fever may be brought to a more perfect Information
instead of Remission and is very safely used for
and may be trusted to for this purpose

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Dass if have of a Emetick preparation is to be avoided and Antim's a Pepto & other Effects likewise prove a Bombe upon of ye Bowels presenting ye use of Cathartics or Sudorifs.

It should be used in such a quantity as to vomit gently before ye accession & not in small Decoctions as in Severy Fevers Emetics should not exceed Coluerit too much warm Water but rather check ye Emesis & then ye use carry on ye Stomach And By giving 5 or 6 grains of ye Tartar Emetic the way many Cures of ye has been wrought endemic shortly prodigiously

We come now to ye Discovery where the Emetick opinion in small Vessels only throw ye Blood into great Vessels but not so much as to occasion a Fever like ye Rheumatism the latter end of Fevers

Many Asthmas owe ow to ye New Poison acts locally on ye Extremities of ye obstructing small Vessels. Antimonials seem to have excellent Effects in these as Spreader People they are generally fresh people in ye Febrile state and other Symptoms of Inflamed Circul.

By giving Antimonial Emetics & Bleeding more freely in ye Lungs and a gentle Diaphoresis promoted if this is given in small Doses but it is often necessary to give them greater Doses to promote a Vomiting.

The Kettle Snake Root also seems to act the other Emetics but it seems to produce no good Effects and indeed not at all unless a Diaphoresis is promoted & yet hard can many who have not been at all relieved by Vomits or Purges yet generally relieved by Antimonials

Of ye many Practice Phys in ye Northward Pleurisies to Antimony & going further.

Rheum^no and Inflam^no Acts by occasioning not a free circulation of the Blood only as over the Whole System, but also by Its Power also more on one particular Part, the Vessels of that part being run into Spasms, this occasioning Inflam^n and this occasion Ecclesia Replenum to subsist.

Thus consider a person of Inflam^n of Rheum^n, the Blood passing out more and greater Vessels in Inflam^n, & more and smaller in Rheum^n, respectively obstructed & Circul^n & occasion Patient Asleep to follow & Conseq occasion great swelling — & is plain.

Inflam^n by occasion are equal strong Cont^n over the System, and last indeed in Rheum^n, and men not be given at any shorter time as this Disorder is not subject to Exacerbations but should be given repeated doses to keep up the free Circulation & Disease is removed, hence should be continued as to keep up a vocat for 24 or 48 hours.

One Caution is to be observed, viz. said that Diaphoresis was to be kept up for 24, or 48 hours but at this time if Patient is very subject to any sudden or Cold, & this remarked by Cambr^s home, came home to when that no Cold Substance touch the Patient: dur^g this time Both Acute & Chronic Rheum^no are cured by this medicine.

What we have said of Rheum^no holds good in Flatter ends of Inflam^no which seem to be spasmodic & small Vessels.

It is a rule in Physic that no Secretion leaves are carried more Heat is depend in another. Hence a Person whose skin is obstructed has the Discharge by the Bowels increased. Hence Diarr^a is frequently in Dysentery^a are carried by

keeping up a Diaphoresis & for this purpose ought to be given in small Quantities & not to sweat too much lest it can prevent it but only a free Diaphoresis & Opium is to be given in it if the Blood be very generally inflamed & Opium may be given in the most Diaphoretics.

In this Disorder a great Quantity of Blood is drawn but Intolerance to repeated Section of Opium is given to stop it it would do harm but Diaphoretics are given to promote Cutaneous Discharge & cannot be called an Specific. & as Antimony has such a strong Effects as a Diaphoretic it cannot be a best Medicine for this purpose

When too small a Quantity of fluid is discharged from the Skin it is liable to affect & sometimes inflammatory Eruptions are occasioned Antimony as encreasing the Discharge generally cures them as we see in Leprosies &c

Dried same very are nicely adapted for the Method of Prevention & Body inoculation by new Antimony

By a continued increased Diaphoresis the Skin is made soft, hence an Inflammatory Pustule has ardors and are seldom or never in soft parts. And we observed that Hazard and Smallpox were owing to inflammation & not Eruptive Fever. Whether it will answer in Smallpox Experience alone must shew but facts and Smallpox are this most likely by this means. It has been difficult for those People who thought that Pustules were cured by Pus & the Nature of Pus & have endeavoured to allay fond Quality of Smallpox by shaking the whole System so that Coach men do as well, but it seems more

Chiefly that it acts as we have just mentd (816)

The Preparations of Antimony are various but it must either be insoluble or its Regulus soluble in the Acid and Stomach. The Calces if perfectly so can have no Effects as they are not soluble & Glasses have the same Effect and Regulus.

The Precipt is different or Regulus, wch is soluble in Acid and Stomach. But the Dose of Antimonials are uncertain to be specified tho we know not how to make it quite such kind Effects as we wd have it in Asthmas &c. As all Regulus Precipt^s act in proportion only to the Acid they meet wth are uncertain of this sort is James's P. it may sometimes as adhere Insoluble Magistery sometime only a Diaphoretic and sometimes lay long in Stomach for sive days & then meet wth an Antimonial has had violent Effects.

The Salin Preparations then are the only Preparations we can depend upon.

The Solut^n and Vitriolic Acid Decomposable wth Lime is doubtful not to be ascertained

The Solut^n and Nit^o Acid is a perfect Corrosion & not soluble in Water, & Nitr of Silver therefore has little or no Effect on the System & if it has any its Dose is not to be ascertained.

The Solut^n in the Muriatic Acid too powerful & also decomposable with Lime not to be given

The only Solut^n then to be given is that in the Vegetable Acid either in the Vinegar or Tartar wch are soluble in Water & not easily decomposable hence we can ascertain the Dose of the Emetic Tartar wch is the proper Solut^n

Mercury neither a perfect metal or semimetal but a fluid one

It acts by its salts alone or by its salts one soluble in w: well mixed joined w acid or reduced to an active Calx has no effect. It thus been used for its only because of hardned fluids & can't have bad effects generally unless disolved impart heavy & may effect increase & inflammation

Its Action on fluids and solids and same and act of other Mediums Salts as Coagulant & Resolvent Antiseptic Effects and Machine however of little use, exceptions Causlie in & fixed Principle but hence to a good deal and Nervous Power and the stimulus & cause too much to be given as an astring or coagulant and increase rather than stop Hemorrhages.

Its Act upon Nerv Power is its principle one in this too wh in part agreed w & other Metals as an astring & stimulus, & of

Its Stimul is very Inflam more so than any the other Metals. If applied to any of the Lungs and Mouth occasion pain, inflam & Salv & occasions a little inflam in the Stomach.

And by its Act brings on inflammation Diarrhoea & Gotum hence those people upon slightest acid are subject to Inflam.

We must not question the impossibility of accounting for its Effects by Mechan & therm & Hydrolly or by weight of its particles. It certainly is rather like a Coagulant.

It acts on the sensible parts behind other viscera & not in the Arteries. Tho' the body is liable to slight Inflam during its Course yet a great inflam never occurs

None of ye Blood Vessels capable of ye hemorrhagia
excepting of Vessels Bursting & appearing of Vibices &c
yet no Effect or any other Medicine can keep it lee
Medicinally.

Diseases always occasions this bastard Dysentery
by its Stimulus Hardens & Body applicable Brown
into Inflammatory Fevers & Exclusion this Cancer is
generally some partial Glands wch are most affected
above ye Mouth & Intestines. on wch Stands Fyed
& Translatory of Inflm from & Thus to have Spots

Tho' seems to have such Effects and lace and
is applied epithets as a destroyer of Mobility on
& Ph. yet by this Cleare many Ulcers or Cancers
Ulcerous sensible lod Spreading Matter, & Generous
Suppuratory Process. hence used for all sorts of Ulcerations
wch Liberal Hospital & no sort of Ulcers but what
are cured by it except Cancers wch we would not
expect from the inflam & Dispos. ds ale Medicines are
in ye inflam & System wch Mercury does yet it has
the power of destroying & Mobility in the Ulcerated part
wch is not of Effect here seems to be wrong.

However this not very valuable unless Cancers Ulcers no
as other Medicines would do it without Cancer attended
with this Stimulus in Bark &c

Its Act. of a Stim. occasions it to be a Deputy
Cordial hence cures divers sorts of Paralytics are dry and thin and
occasioned by a obstruct. and Glands. Dolor Lepprosy &
But its Effects here not so very valuable no as an
Emetic nor yet as purgative wch the same to have no
Effect but to fall in or other Medicines wch act by Stim
Stimulus alone. hence it is not absolutely necessary in
Practice as we have other Medicines as good

Its particular powers are to be used (use of Lye
without it Mercurial might be in hazard of being totally

When this Poison is absorbed it goes into the lymphatic
Glands & then goes into the Blood yet seems to affect the
Air is necessary for its Poisonous effects. Poison when
secreted into the Glands of the Bones & Mouth & Intestines
takes place & goes on very readily & this Poison irritates the
Glands & produces Ulcerations Bone & Teeth will make
the same all over the Skin & Scurfs & Pimples & whole of
the Juices become tainted & the Bones be affected.

destroyed were of no forts use.

It seems to have some specific Virtues of cure of this Disease. In order to know how this is to be should consider the Symptoms of the Disease but first mention the specific Remedies of the Glands of the Mouth by it is first to be brought there some time before they are th inflamed & Glands encreased & Bellens and all Glands th secrete in quantity more than natural must become pushed & weaker & cream Dysenterie Cancers &c & Ulcers can not for it without breaking down th Blood

The Lues Venerea is entirely an infect Disease It seems rather entirely a Disease of the Mucous & seems to be permitted into substance another greatly irritates of Glands

If any infected Mucous is added to an infected Body early thus it is of way they communicate & neither of them, nor of pulling water any other fluid unless impregnated th a solver of the Mucous and Albuty. It may be communicated by the Mucous being translated from any part to a Diseased person to the lend parts of the infected

The Disease breaks out in two ways first which causes an inflam th & increased discharge matter Ulceration. & 2dly when it only affects the Glands encreases th & secretion th. expose Bubo Clap.

The Symptoms open principally in the Cellular Membrane first they absorbe the fluid more decided than formerly than as it passes out the secretion of fluid into the Cellular Membrane absorbed & this is the Disease between the two Diseases a Clap being which affects matter expressed and Mucous Glands encreases the secretion th & into the Disease exists since necessary matter should lay some time in the Glands before they are inflamed therefore the secretion matter

(823)

Essential Oils, to be avoided as stimulating & parts too much, and Aromatic Plants in obstruction

cure itself and this may always generally
but after this is discharged the glands still remain
of tumefy continue some time after. Infect is carried
off & mollify able to affect the mind upon
Lancashire.

But it is to be remarked that this matter is
extremely acrid hence occasions inflam & sloughs
to itself causes ulceration & is absorbed the Cond
in order to cure this is to avoid these dangers & stop
& that alone within itself these are to be obviated after they
are on by Bleeding &c — And we are never safe
from the Blood being affected once there is an Inveterate

Bleed and Cam affect the pond system alone
takes off an Inflam & effects of system in general
but how Inflam which have confined to particular parts
& affect of whole system are not to be cured
by this opn. Hence in this case we must
Bleed hastily unless Pulse have fail & sup
purtate Bleed vari & Bark & Bens is opposed
Farther another methods of local opposition & is
end. The other way of local old but is liquid Bers
destroying & sensibility. Bad acrid matter & takes
most almost immediately is lapse & violent
order hence the bowels & this by end & bled
parts of the Body by Lymphatic. Pulse has a bad & tor
with organ to this pressure and glands should be mean
irritated in order to carry off the irritant matter. hence
or matured matter white & discharge continue long but
if the symptoms are violent we must use bleed it
prev & glands by & smooth might Inflam are
inclined to form into Mortifn

The way is to be observed that by keep a cooled
bread or another Quard & this phys especially in the Gobble
is some real duties of the on another parts & the them

A lunatick is a person that hath his senses & reason
disturbed from birth too be hardly cured & yet
as this way often injures one & disturbs our business
more than most other sicks & leaves behind
& this way ought wholly to be sometimes
now & then.

The 9 way is by cold & glister & emplastrs per
lower end cus found from Mr Mustor his book & is ayd
in & smoothing in oil or mucilage & by gentle purge
aginous Medicines internally, have seen Lunatick Fear
fully may be obviated by avoiding wind & all
irritation as pound & salts and drinks noted salts an
ingredients & bold lectures more sensible his chiefly
drinking large quantities of liquors as Ale

Cert. 57. The Effects of Continued

8°55

Mercury is remarkable for the Force of Blood & no other Medicine effects.

Another way of curing the Clap is by the Chinese Calcos of Mercury, called Vermillion, based upon principles of Chemistry probably and partly being a strong matter of Mercurial Cure, they don't cure the Clap as they think & then cutting the Mercury is not taken away & the Clap returns with greater violence besides inflammations by such Applications often ensuing Gangrene & Mortifications, some other Salts accepted Mercurials ought should be applied.

Mercury has a different effect in the active properties & margined than & matter & thinner yet visible & Injected Matter is probably upon thrown off but after it summed & probably exposed begins to rot & to Putrefy & destroy of sensibility & after a little & then becomes Electric as of Dollar Salts had been used but by Mercury Salt instead of Mercurial Calcos certainly offer Inflammation & prevent-ions

Upon repeated Injections of Calcos Salts the same happens but in less degree & this Salts such time and infection is destroyed. So that in a certain Infection is generally quite gone. Old Mercury commonly Doth produce any effect after this time from Calcos Salts

But his advantage to attend the use that they stop the Bleeding & Patient is perfectly cured without any hazard upto return. Yet Electric often ensues which are troublesome & this Blood Impenetrable unless Habits Lord & other to reducing Patients

of the Injection of first time of Using increases the Thirst & is thin, but afterwards the Urine becomes gradually thicker & in less quantity

The Reason of preferr. the Salt. of Mercury is. that of Mercurial Acid attracts the stronger than any other Acid & is therefore not so easily separated from it, & besides some Acrimony may remain in the Urethra, & contains more Acid ~~[illegible]~~ than Mercurius Dulcis or precipitate

The Mercurial Ointment dissolved in Oil is a Salivating method

[illegible] will not be dissolved in 19000 times its Wt. of Water not wholly soluble in Water

The Best Precaution against Salts with
Acid Calcareous Best of them is Mercurial Ointments
made of quicksilver Lard Violent Salivations
Fatigueing But these don't seem to propose a
solution
ing Acid as in Sublimate &c. is to be used very dilute
Gr. ℔ to ℥ of W. & Mercury ℈ ℥ to ℥iv of more W.
Gr. should be compounded distilled Mercury. Good Cancer
W. contain Calc to precipitate the Mercury & how far
as good as any. It is to be tried by wagon injection
& Inflam. is very greatly Injections should be used
once or twice will be generally proper. The Pertinacious
of the human Inflam. arising from Bleedings should
proceed. Strong Gr. Apple Spirits of ℥iv
of W. should be tried first & given in open & ℥iv
tained some Regimen a little pain & it affect gradually
causing more & more Salivation added the proper Food
W. Fullers Earth ℥ii & Salivation to ℥iv of W. & Food
not give Pain immediately upon injection but
Little After dinner & Evening Food & Bitters & Stim
cannot be all concurring this is to be repeated night &
morn & bitters middle of day during a few
days & Cicuta & Adonis Vernalis &c.

The Men continues longer more than others
according to state of their Mucous Glands sometimes
salt over it & though who have such a good habit the
Men generally Gives over in 30 days but the
is to be continued for also or three days. & then
Patient is cured unless there have been ulcer
ghts is not generally done as Glands don't separate
so much Matter with Glands alone

Thus Mercury induces a painful strangury
alt & Bulb & Urethra with heat & no consti
quence going off by use of Oil for a few days

This Mulled Man seems to be Flesh but other
& Prepuce covers the Glans or is introduced
piece of Lint & Wrap in Clean linen & remove

that there are not infect that give way to Burns
Ointment or any other of Mercury seem to destroy
its Infection

Another Method of Cure is by internal use
of ye which is not now so much used tho as effectual
in Clap it is in Gonorrhea scarcely ever of parts
affected that this Method is attended with this
inconvenience that it hurts ye Inflamn wch this
Disorder is at prest attended with besides the very re-
-able use of Sup of bone mechany inets use
This however is of ye use when the Infect is not wan
off of itself as often we have observed been of protection
by lets of Men give itself wch Men continues
for some time & infected. In this Case Quicksilver
succeeds stops of Salivating -

One Method is stolen off the Infect being gone
off is that the Matter is not yellow or Green by mixing
in any part of the Body has this Colour when in con-
-siderable Quantity.

In the Stage where it affects other parts of the Body
produces Inflamn & Ulceration into the
Secretory Glands thus infect & may be absorbed into the
Mass of Body & Lymphatics we can often trace
out parts affected Glands as indifferent
and turn pale when Infect received lurk lowlie

It produces no Effect when introduced into
Bo no wonder alter it diff is a strong proof that this
Vessels have no Effect and Bo & that the Blood Vessels
are not capable of any Chymical Stimulus for this
is most acrid Poison & Poison. But the Matter
may be secreted into Glands where a peculiar
Lymph place & Ulcers are produced in the Glands
Lacts Cum & Mouth &c these contains till more
Infect Matter is generated gotonsoll of Glands o

(11) To explain this. Suppose a Cask full of Water & this Water have a handful of Salt deposited with it then let a Current of Water run in & run out of the Cask the Saltness will grow dilutes & dilutes till no salt is left, but if more Salt should go in then comes out contrary will happen. This they said was the way Mercury cured. But other Physicians in certain Disorders well

Some have said that it destroyed the Infectious Matter itself but this cant be as it is applied in so small quantity, but its probable it may stop the fermentation going on that is already formed if carried off by natural secretions

or It may act by destroying Mobility - & so that little Infectious Matter can be formed, as Glands are inactivible & so no Mucus is seperated & so cant be affected, what is in the System may be so neutralized

afterwards affects the Bones mentd in Cross
prodnc Cases famous Ellero and sometimes in the
soft parts and called Cancers but were neglected.

The only Cure for these was the Appn of the Cutting
& great Incision thought wanted it. Used only the
wine Hd this said. and West Indies of Blackers and
cured by Incisions & some Herbs but is not so cured
in Europe.

Which Dotrine of Acids & Alkalis & Ferments of Bones
in Bojacal works and lowerd by Ferm of Blood wch was
Suspected by a Discase. but no find of Acids any
Effect on Bd its a Mysterious one and if was
Cale & Sepn of Bd Coagulated Lymph promoted Bd
Hardness its

But we do not say alkalines of Bd and Evac
cations used to such excess of Coagul Lymphis
unless Qs but this not Dis of time of the Effects of Bd

The 2 way it was of lopping was by Evacuation
carrying off Bd passed & fresh Bd being made in
& there all Bd no increase this as a great Qs
evacuation wch Qs must be made to supply the
place. Some say by prodn of great Fermentation
upon sudden change of Mass of Bd. but there was
a number of Objects to this.

1 the ferm Dont go on in proportn to Evacn
& where Evacuatn is by great Cure is longer &
seems to be a general Rule Nature Moves & is
thrown in. & the Excessive happens Sooner is
Dispatch cured. besides Incisions & Deliriums &c
Pulses &c weight do avoid. hence not by alone

Another Method was of Salts of Bd applied
to the infectious Matter immediately destroyed it
in a Chemical manner but if this were done in
the Infect Mass Necessary to cure.

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Another way was often prevent'd & fermentation but this don't seem sufficient to cause it for it don't seem to stop any fermentation, tho' it is a pretty general rule that a substance wch stops one will stop other fermentation

The most probable way is that it does by its bodily substance by mass & parts immoveable to this particular Ferments but did not on this was the only way and matter wd soon be overcome and

The foll. facts seem to prove some thing of it as by the strengthen'd & obstinate general Mercurials & habits are soonest cured in Fevers of other fevers and also.

2dly. The treatment of ridden & patient long thereof & Disease & patient is never cured by salivation so soon as it now is caused. Tis not of a peculiar pers. of Patients hospital and Home unhealthy Habit & low Spirits have bad effects & many Buboes have degenerated & relapse by Patients sets out & their bad Spirits &c

Another fact is if often worst cured & Diseases in low habits but if you prest than often & bad often gave Mercury but not to salivate were often cured & this often occurs and in Wd Man Water where they get good cheerful Comfort & when all Physicians & Process hed failed Nurses succeeded

Another Medicine wch has been seen in these Cases is Dr Assafoetida Rhubarb with Wormes often remain after Mercurial courses. Caries & Excostoses combining these often cured by yo Medicine and other Medicines I can a good many Cases where Mercury hed failed in these Cures

Now dacto we can't tell what is a good Medicine

and is of good use in softening of Bones

Mercury is a substance Valable Precep^t which
given will always cure attend to of other Cinnam
Clange and strength. &c

Best Lenitive Precep^t more eligable Ale the
Precep^ts to lead have more Stimulus in prop^n
to their astringency hence called preps-
able and has confirmed. by practice of wise
made by not of any viscid substance to stick
It is given thus internally in Mercurial Pills
Externally in Ointments. we w^d imagine that
the last is the leastway because most apt to stick
to Cotton every bind food & slip stimulus, & we
can throw as much Sweat & in this way
without salivating or purging. Cautions
must be thrown in Cases of Disease, & if
Salivation comes on we are obliged to stop. Rosen
by its effects & Gutta obliged to give Opium
with hurts Medicine

The Best way to manage it seems to be
the best to give no Medicine internally except
to amuse, and may sub on 3 pr of Mercurial
every other night without danger of Salivation.
Did Mercury we give more Mercury than
time. Mercurial can give internally so that
we need to give it Purging but every other day
stay to see w^t effect it has upon the Mouth.
If Patient has the appearance of approaches
Salivation we may gradually increase Dose
Inflam. come too stop Ointment cont^d
half of d^o Mercury but if we want to
salivate more may be given but if salivation
seems to come on we must desist & Purgam

must not go out in ye Sun but may ye other part of ye Day especially on those days in wch he does physick, & should use no flannel but mouth in wch by its irritation brings on a salivation often in using ye Q this way small pimples appear about ye mouth wch are not to be discouraged as they prevent Mercury sells lord other Glands.

If Patient has been accustomed to drink he may be indulged in a glass of Porter or Madeira but Spirituous liquors without water are prohibited.

The Ulcers should be dressed w Mercurial & painting them w red precipitate by a pencil & if smaller becomes good red not be dressed oftener than every other day.

The Buboes may if Mercury could soon be discussed & poultices should be applied but are not to be used promiscuously as ye Bryony root has ye best effects. But if they come to Suppr it should be promoted & ye hardened parts cut away w ye Lunar Caustic

The Dr saw 2 or 3 Cases of ye Naples Venereal, wch cut away part of ye Parts then appear not to be stopped w ye but shorter lessen & Bath used.

If ye Ulcers happen to be of a low habit we are often obliged to recur into ye Cinchona bark & strong generally cured in a few weeks.

So much for ye Cure of ye Bubo

Composition of ye Bubo

It is not probable any substance wd know in a Physical Element but if any wd medicines for we not decomposable, nor allowed but by addition.

They are said to consist of ye Sulphur &c.

Earth introduced by Chemists ~~but not~~ withstand fire, was said to be got from several sorts of Metals, but was only a white earth procured by adding Wt. that this upon add Phlogiston is solid Metal itself.

The Metals so long & Earth & Phlogiston forced off they were found to be reduced, but many Calcs are off 16 to Silver & Platina can be reduced without add Phlogiston hence we appr. that is not necessary in Metals but probably approach their Calcs by uniting wth the substance necessary to their Calcination hence the Metal as reduced is in fact Lighter than before Calc.

One appearance w seems to prove that Phlogiston is in by their desiring wth Nitre but that appear that Phlogiston solidified when to Air so

That Wt is in Metals is only to be proved by Publicn but in this way a considerable Degree of warm Air is thrown thro a Cold place wh seems prod in Phlogiston not to be got from Air

We can destroy all other Qualities except Metals wh can always be reduced by add Phlogiston no change can be produced of Metal into another Substance nor the Alch. ever made that they may into Gold.

The following copied from Symmons
& as I suppose was omitted in my

We have now gone thro' all the different Metals
we will proceed to make a short Recapitulation & as human
life should compare them give the method of distinguishing
them & of separating each from one another. at least such
as are found in the different methods of refining & reducing
them.

Metals when pure are easily distinguished from one
another by their colour, specific gravity & other well
acquainted to them. When pure they may be known
by their specific gravity which is as follows —

Gold to Water is as 19½ to 1 Platina 17½ to 1
Mercury 14 to 1 Lead 11½ to 1 Silver 11 to 1 Bismuth 9½ to 1
Iron 8¼ or 9 to 1 Tin 7½ to 1
Gold may also be distinguished by the ratio they make
with different acids.

Another chemical way is dissolve the metal in aquafortis
& then precipitate by means of another metal, and by
this means you may know what metal it is that you
have and it before, & that by dissolve it in the acid
supposing it to be copper & silver no precipitate will take
place but if the contents of copper will be precipitated
& so you know it is copper.

Gold is separated from silver by Inquartation. Salt by
Cementation is to be done don't use Silver but in a
fluid form, but in form of vapour. Other mines
to Inquartation effects of Salt Petre is nitre & then his mixture
is changed & put into a Crucible. When Heat is applied
round the Crucible attraction takes place.

In this state a sodium [illegible]

Most of ye calces of ye Metals are calcinable by simply expelling some of ye Air

Some of them revive by ye addition of Phlogiston alone as Antimony &c in ye Mur. Acid

Gold Silver Platina Copper and Mercury are reducable by Heat alone & often by ye Heat but of Mineral Phlo as fixed Air does not seem to be so good as other for this purpose

The only proof that Metals contain Phlogiston is that they deflagrate with Salt petre. Copper does this as well as any Metal yet Copper when in a Calx can be reduced without ye addition of any Phlogiston

What Phlogiston is we know not certainly probably it is nothing more than fixed Air in or adherent to Bodies but this is only Guess at.

We shall proceed to examine ye Metallic Precipitations in ye Pyrotechnic way.

Vitriol Calcin in this we have ye Salt without any Water

Colcothar Vitriol is a Calx of Iron made by driving off the Acid that Vitriol will remain.

Sal Vitriol in this way we get the Salt of Tine from

Cerulye Mineral precip. is Mercury a Calx being made by ye Acid and Air into a Salt & then washed off as this is Pouring Quicksilver ye Salt that is first made & by ye Air is ye Vitriol of Iron, but in London Mercury Calcin is Mercurius Chalcinatus Sulph precip is not volatile with Water & no effect unless that is some Iron w ye it is not made.

Flos Martis is ye same as ye Residuum

Sal Martis is same as Com^n Green Vitriol Spirit

Caput Leonis is ye Salt without Water.

Flach Saturn.

Lap Indicum here is a confused jumble & when y^e
Operation is finished there will be in it preparations
of very opposite qualities. & what they intended for is uncertain
William Bulver this Fl^d Mercury is not so good a way
as rubbing Tin in a Mortar just ~~before melting~~ for Mercury
he said more is calined that way Vulg^y called y^e is active
Argent Vivo Bussy this method is very wise & clear with
from any thing but Bismuth, Vig washing it only
washes off what is calined, straining thro' Leather
will do as well.

Mercurium Dulcis will be Tin dissolved in Sal Amm
& ye Mercury will be in ye Sulphur made Cinnabar.

A th Mineral the Calyx of Mercury made in dry fire
is inert, so is this, but maybe active if it meets wth an
acid to dissolve it in ye Stomach. But Antimony wth is made
by ye Chymists is done by pour Mercury into melted
Sulphur is perfectly inert.

Corn Aral have spoke of before

Flos Corvi Sulp: this may be done easier by Ag
Regia Other Sublime).

Mercury Dulcis or Calomel is ye Mercurius Mercurii by repeated Sublimations made into an inactive Calx & ye Corrosive Sublimate is ye only one active of these preparations, but here you may give 10 grains instead of one.

Here Calomel an active Calx of Mercury

Here Precip Alb is a precipitate partly by ye Volatile & partly by ye fixed Alkali & is quite inert unless it Emetic & not hurt my Stomach.

Here Corros Subl is the salt of Mercury calcined

Here Coralline is debruised & its Acid by [illegible] ye Volatile & therefore less good

Here Emet Stibiat the washing if continued would wash it all away

Ralph Emet Precip is not a Metallic preparation the exact proportion of Regulus will be in the Stepar Sulphur

Crocus Antim has a little Stepar made & is washed off

Tartar Emetic ye only preparation to be pondered on ye certainty of any Antimony

Calx Antim ye Regulus is made into a Calx & is inert, but a very little in ye Menstruum volatile in the Stomach.

Cerus Antim.

Cymbal Antim nothing but common Cinnabar having no Antimony in it.

Tin Antion is only an Emetic Tartar deposited in Wine of Tartar that is always in Wine dissolved equally with Antimony.

Vin Stibiat is solution of pronen Tartar & therein is wine dissolved Vin Antion.

Tenet Antion is in reality only a Final Regulus of Antimony

Sulphur is black or red & differs from brass being in both Metals but opts bone not fit for Medicinal Salts in

Pil Sophorae within has a Calx of Iron

Lime Coral Sort. & Mulies are Calcined Corals Antion & is used substances. Some have objected to Mercurius being rubbed in Water, Oil & Spirit Turpentine Liquids sooner made into a Calx by this means, than if Lard alone is used, & nothing very vicious Apothecaries are apt not to trouble themselves to calcine it whole. But if we want a little for a Grain pill some round Gentlemen this Text is left in a dalang.

White Precipitate is dissolved Mercury resembling Calomel in being left Radical Fumigation Salts

Calc Earth is soluble in ye Vitriolic Acid making Selenites
or Gypsum often ye matrix of the Earth — & crystallized &
ye Salt falls down in a Crumbly powder making ye
pearl Selenites, for it should be calcined) sometimes in ye
in large Crystals called Selenites sometimes in small
ones joined together called Gypsum sometimes in a
flaky form resembling Salt, or in Threadly form called
Asbestos

In a Mole unless ye Sulphur exceeds a Hepar
Sulphuris ye in Mineral Waters as is Sulphur &
is fixed alkali

The Bolonian Phosphorus is thus made
Take Bone Shellings put into a Crucible & so kept calcined a piece of glass is put over & luted on to keep off Salinates from hurtfulness Air or Water & then the Crucible is exposed to fire for a little while & be very luminous for several days

Alcalies of Pearls & Salinates calcined so as all the Water is evaporated & then put down into a fine Powder & fusible Water is added & absorbs the Water & so concretes perpetuo Usque

Quere why then is Asbestos said not to be destroyed by fire

Allum is made by exposed Pyrites to the weather & part of Allum w[ith] underlet & Vitriolic Acid

Crucibles burnt Clay this imbibes ~~this~~ of this of burnt is used it is harder but does so well & can fire

Sect: 5. 58 of the Earths.

No 86

We now come to Chap. 6 of Calcined Earths

Earth is a substance insoluble in water but in its mild form, but Calcined Earth is partly insoluble in water & consumes & forms lime when burnt, not brittle, not easily broken, not friable, hence distinguished from Salts, not brittle, not easily broken, hence distinguished from metals, not friable, hence distinguished from Salts

They are divided into 3 Kinds of Absorbent, such as are soluble in Acids. The Lapis Ollaccus such as are not soluble in Acids, they are partly insoluble & also hardened by Heat.

The 3d is of Crystalline Earth & is such as is hard & angulo vitreus fixed by Heat & not soluble in Acids of Calc Earth. Still stone fixed but than is distinguished from Crystalline by Calc being soluble in Acids & Other not.

The Crystalline Earths fixed by Heat is insoluble in Acids & if ever used fire grows harder

The Absorbent again are of 3 sorts

Calcareous Earths such as Coral, Lac conchilium, Cornus cervi & Lumbricus

Magnesia

Earth of Alum also of these these are soluble in Acids yet differ from one another in their other properties.

The 1st sort of Calcar from Sand Quick Lime

The 1 sort of Calcar from Sand Quick Lime found Native in large masses mixed with other substances, and of its form.

The material is called Calcar Spar in a Crystal form but mostly with Water & thus is in large masses in Mineral & one of Metals & Crevices of Rocks & yet found in very large Masses

Clay is found united and mixed into a stone not unlike marble sometimes in Clay, & also in other numerous subsistances by a gelatine or oil overcome & the Earth precipitated. Metals & Ores of Metals in Stones & Stones & a considerable Quantity of Sand in vast beds into Lucent Lime: & in order to this the Earth must be mixed with Sand & not with Clay, it is to be considered into estimating the Quantities.

When mixed in Clay are called Marles there are only Mechanical not Chemical Solutions this been used in Quantities by Farmers for Improvement of Cale Earth alone & its Solubility depends.

Castle is found in a metallic form called Chalk pretty pure from other Substances.

Besides this found in Vitriolic Acid made Gypsum & similar & Salts.

Exhibiting found in Marcasite Acidis combination of Cale Earth first found in Earth was originally Animal Substances.

It is probable Igneous Earth at first was covered all over with water in its first Centers & only highest mountains. Many marks of Centers now seen on high Ground. Sand is generally found heap to the and Ores colected Coaly and is not in higher Cultivated Sea has left Ground also and Inglish parts did seem not seen higher.

Hence it is probable Shield Ores is yearly cal cined into Flocks etc & are yearly generated, & it is probable it only of highest Alps were first inhabited & first Islands were gradually formed with the Sea.

Moreover where ever Cale Earth is found are Shells & Bones of Animals. & in Coal where Shells are found perfect, perfect depth varying are how they are not in such Calcium Sea.

[illegible] earth not a native fossile but [illegible]
of Vegetable & Animals.
The 2d copper in the low Pit is either from Vegetables
Dissolved & precipitated or else [illegible]
Petrifaction there is nothing left but Earth
[illegible] & [illegible] destroy
The Pit in Animals & Shells of Fishes are this
Earth by [illegible] & Vol Alkali. also in Shells
or habitations of Insects and Worms & Eggs of this
Earth but generally in Insects or Animals in all
of Coral & Corallines in are generally full of Insects
Holes & Cavities & are filled up with a Spongy
Stone & Land Insects also form such Habitations

Also Almost all Shorled Crystals formed in Animals
also of this Earth Fossile & Vegetable called Bezoar
Inst Stone in Body in Gouty Cases.
and of Stones in Bladder consists of this & Oil & [illegible]
It is also found Earthy mean & Blend Calcareous
any amount & substance however this differs from
Common in not be converted into Lime unless
& will be speed from it
also Petrifaction of Earth is Bituminous Oil
is in Petrifaction
Stones may also be made Crystalline by Calcining
& by Heat part of this appears Crystalline &
part of it Coarse Earth.
Stone and Tobacco pipes from Chem Vegetable &c is
converted into Earth
All these dissolved in aerial Acid & precipitated is
same a White Spongy powder
But Calcined for 2d of fixed Air is separated from it
& other changes to Quicklime. the Calcareous
Earth-magnesia and Lola a comb of Quicklime & fixed
Air. Several Mixtures have been made of Lime & it seems
to be only the Calcareous Earth deprived of its fixed Air
& Mines may be rendered Caustic by Fire or by Brewing
up the Alkali but Calcareous & Magnesian Earths indeed
change from the mild into a Caustic form like the Alkali

they do not open their Shells, yet being boiled a good deal
in the Boiling, the Calcination is performed in the Quantities
of Chalk or Shells, and yield Lime and Clay.

Sometimes also the Shells of Fishes are made use of
for this purpose & there is but little difference betwixt
them & the Shells of Land Snails, unless that the
Lime made from them contains a small Quantity of Impur
cumable Oil. which makes more difficult.

The Calcin. is of a Lemon Brown Colour & substance
when changed its properties considerably so that by add
Water it becomes hot, and a few grains may be dissolved
in a Pint of it. It is also so soluble in this state
that it powders by upon the Air.

The Ashes of Vegetables, by add. water have been many
times used & acquired the Burning Qualities, as are represented
by Mr. But it appears that this Heat is generated
by Solution. attract. of Water & such force as to generate
Heat and some Substances which will form Air
which forces a to burn & Inflammable Substance
as Charcoal is well seen in Alum Phosphorus &c.

The Lime Water from Shells by heat & Empty
is more Disagreeable & this is called Difference
between it & Ashes.

Not Water should be used as a method of Solution
sooner Vine Spirit more perfect.

The Earth by itself is not Vitrescible but mixed
with Clays very much so hence not rarely employed
in building Furnaces Clay alone must be used.

Applied to Other Substances

Dissolves well & leads to Diff. Circumstances
both of Metals & Metals & Substance soluble in
Water called Gypsum Selenites, Salts & Plaister
Stones Spirits & Water Joined & fresh Water added
by contrition into a solid form. Thus the Heat is applied
& becomes insoluble & Generates Quicklime by destroy

(a) 863 Hence some Eccl. Wales, chang stand. Vicar have been to contain Affinities but in only three

8 6 (4) indestructable by fire

Some of plants and Vegetables are not consumable and
so also for ought I know have been converted into
incombustable Cloth in ancient by burning

I think also not improbable hence under Lanthorns
of Shepp.

Almost all Mineral Waters also contain some
of these Earth in small Q^ty and Calcinable form

3d Comb^n 3^d of Nitr. Acid. mat^r a salt earth
soluble in a small Q^ty of W^r then was a salts have this
particular property thereof exposed to g^t heat calcined
by g^t F^e & F. Crucible covered over then exposed to
a strong white heat change a property of being common
and Earth & then lastly exposed to air found hum
interpos. loose by entirely this Concacum table
no wd upon no wth this humidness more or less
soluble and Nitr Acid with Lye and
Shell, & hence said to remain Alkali or its Principle
Dualtipes called by French when deposited into
Water Mule de Chaux. & fixed Commonae chemist
deposited, and was long kept a secret for cure of
Stone

Alto these salts from Sp. of Vegetes Green
have been called Alkalin Salts & by this
Menstruum solve dissolving crushed from N^w Earth
the Calc Earth is not to be united in Alkalies
by solut^n but may by other means. Corrosive Solat
ile it may by Sublimation.

Are capable of Comb^n in fixed Alkalin solved
off Glass but have Glasses are opaque & Milky & these
may be decomposable by deposit in Acidity & then
precipitated by Acids. & hence from Glasses cal^d into
Solea by Acids.

In its Mild form cont. combine in Inflam
bation as C^n with g^t ale of oil into Soaps Amel^n
similar to C^n Com^n Soap

By boiling Oils in Pure Water & Oils in made
Concordance & Doctrine of Oils being mixed to

corrects by means of lead & is overthrown
Oil may be mixed with Water into a form that
not a perfect or real mixture with Water
With Salt make a Hepar &c in Water & Water
will unite & most of the Metals and form of Glass
& Metals protean changed & this end dead
It is capable of union in other Earths and form of
Glass but are always opaque and not like Rock
Crystals and yet will all soluble in Water but
it is hence lost. The Lime dissolved and Water
for attracts air & makes precipitate & settled bottom
& is so lost & mixed Chalk fixed for ever & Lime
It considerably assists & promotes of Vegetables
Cinders & Venegar generated and post fermentation
& hindered the Putrefaction hence & in this
Earth in Marle & in other Stones & Soils probable
such in proportion and improvement matter they contain
& in washing water Earth & Calcareous Earth probably
makes and Mean water putrefy & then degrades as is
already putrid hence & Pavement and Marble &
& the putrified and Tops of Houses.

Applied inwards and Stomach Colon & subsequent
air Chalk has no effect Caution the Caustic Lime
dissolved Coagulated Fluids & applied in great
quantity dissolves them.
Intended & Inventions in putrefying have been
mentioned to be used in Long Voyages.
The Earths have no effect on Body. The Mild Calcareous
no effect except a little astringency hence Chalk
used in Loose Doctors. It Chalk remains as bright
man that might from Bones.
To the Chemical Medical Properties have been covered
and can. Corbut smelling is applied to the Body Inflammation
ly is Caustic & can & this can be given only in
small & has there is a considerable & of Salt Ammon

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and Bo of decompos of Vol Alk under the Fire lies
implicit Shell, which can have little effects as we
have already said neither can urge the Bladder
till thus altered nor can alter from our immediately
blood Bladder Lachry and Bones & much Second
hence this Substance can certainly have little Effect
on Medicine

Sect 9 59

The Magnesia has been last Years known.

It is united to the Vitriolic Acid

It is the Magnesia Glauber. or Epsom Salt

It is concrete in considerable Quantity and is probable
that it was not there natural but made from solute Alkali
being changed by Decomposition and Air into the substance
Stone in the mass of Nitre called the Mother of Nitre. but is now
made from its solut in the Vitr Acid

It is obtained by Dephlegm Alkalies & Corporating
pattosem being changed into this.

It is obtainable also from solut of Vol Alk & Alk
fixed off Blood & Urine

It is from solut in the Vitriolic Acid and Epsom
Salt by precip with fixed Alkali with the Vitriolic Acid
matter of Vitriolated Tartar. and this is only soluble
in twenty times its weight of Water we must dephlegm the
Epsom Salt in 20 times its weight otherwise it will be
difficult to wash the Vitriolated Tartar afterwards from
the Magnesia. After precip this to be washed repeated by
together precipitated Vitriolated Tartar & Alkali shewing
lie among it. It is then a little Blackish and Parte

Thus precipitated has a considerable Q of Air which
is separated afterwards by a solut in any other Acid
But Fixed Vegetal Fixed Alk may be precipitated without this

Quicksilver & acrid Salt Earth is soluble in Spirits
Quicksilver when made Cor in W. but differs in not generating
Acid.

Lime all & other Absorbent Earths is soluble in
all Acids. in Nitric Acid makes Epsom Salt
with vitriolic Acid makes a Salt easily soluble
in W. All these Salts applied to Stomach are Purga-
tive by this approaches nearest to Purg of N. Salts to
Alkalies.

It is not soluble in fixed Alk. in Mineral Solut.
solution vitreous in dry is uncertain

~~It is precipitated~~ not soluble in any of the Earths
or metallic under W. Oil

It is probable ~~that~~ Mercury with Sulphur in its Form

It putrifies easily like Animal & Vegetable Subst.
Hence known Sea Salt ~~has~~ rather putrescent than Anti
putrescent Sure not proper to preserve meats for any
considerable time. but when freed from Magnesia
becomes more Antiputrescent hence Bay Salt Sea are
used if have freed Magnesia as much cleaned from em
as possible.

It is of all other Substances most proper to destroy
acid Acids and Stomach preferable to other Absorbents
& Alkalies because clear from some purges Volatile &
others are astringents.

Some have been afraid of concretions made to Vis
from this until certainly dissoluble in W.

By destroying Acidity by this we often doubt cure
because more Acid is generated by Weak Stomach
some Wine & such Medicines as make meat stay
but a short time and Stomach & prevents as have Acid

Its Solut. in Acids are also purgatives but
not so good ~~and other~~ N. Salts because more disagreeable

No 59 Earth of Alum differs from Magnesia & other Salts
of Magnesia differ and is rather very much different Salts
with the Acid Sulphur

It is not generally so rather but have been lately
made at Manchester. But is generally so combined
with Vitriolic Acid in Alum but Alum is not generally got
this way but it is made thus

There are some substances so in Nature Sulphur
& Clay or this Earth there are decomposed as the
Water & Acid unite to the Earth afterwards the Solution
is poured off clear & evaporated in
& much dis sometimes in vacuo and Earth
& Alum so in Menses of Roch

The Earth may be separated from Alum by a precip
with Magnesia water.

The Earth of Alum with Vitriolic Acid makes a Salt
crystallizes in double Pyramids &c

It is soluble in Vol. Spirit of Nitre Acid but exp a
very small Qty of it hence difficult to crystallize

These Salts differ from other Salts in being
strong astringents.

The Earth of Alum is also soluble and Alkalies
in some small proportion. ~~but water in much proportion~~
~~and vol alk~~

It has no effect upon Air
It does not dissolve in Metals
It has lost Acid Acid Mercury and Metals
whilst all other Earths have greater hence the three
earths are distinguished from each other as Metals
Alum is precip by Metals.

The Magnesia may be known by being precip alcali
by & not fixed Alk.

The Calc Earth may be known by being precip
alcali by fixed Alk but not Vol. Hence in Mun Salt

The Glasses made of this Earth [illegible] Mixtures or Other Earths and Metalls have not been much examined

The Elizabethan Chrisits made from humbtile infused by lime or Vegetable Substances. Alum rather prevents putrefaction

As to its Med: Properties its Salts called Astringent Acid Body & Alum Powder have advantageously used in Hæmorrhages.

Some of the Earths seem to have been the Origins in middle prior from

Clay distinguishable by hardening in the fire & by its Ductility in the absorbs like a sponge dry over water as much before: will by being broken into very small powder differ from Chalk in this. Burnt & hard prop. loses this Property.

The Clays are very Ductile are called Boles Cut Pipes Bolem & Stoppo have a proportion of Iron in them & are very heavy powder on a small Dyed strong Acid & is Aquiline shows hollow Colour stained Iron

The Clay is hardly cured perfectly pure from Calcy Earth or from Sand.

Clay is soluble in Vitriolic Acid

It not soluble in any other Acid unless first dissolved and then exceeds. It is Lime soluble the Earth of Alum is probably is. Its solution and other Acids other

Clay exposed to fire Crucibles are in Coin Vessels but mixed with Sand these Cracks are prevented from mixed of whole Substance

Earthware is usually Brittle in itself also unless joined in other Substances, as incorporate some Vegetable Crucibles Holland ware without Vitrifying, is take care to burn it from Iron & by Salts and Acid of Vitriol, & by burning after, dont burn it this a sure sign that it burns Iron

Tho' we can't easily find Clay free from Iron yet it
can not be by Boyle on a large Scale of Metal is
taken up from the Cale Earth. It may be cleared
from Sand wch cannot be Vitrified

Talco often contains Gypsum & Selenites wch makes
it more vitrifiable this is separated by Levigation

The Clay is often thus found & burnt Clay
makes Gilbert Crucibles

This is called Gypsum wch makes it impart Vitr
iscable makes wch Porcellain. Gypsum

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Crystalline Salts disposed formed other in most beautiful
Cube in Lead

Plants generated by Vapour how?

Talco are formed of Clay,

c not capable of union by Fluxed Solution
But is possible if the substances avoid fixed Vegetable
Spirits. V. of this Author said, this makes our Common
Glass if a Lead of Lead is added it makes it Ductile
Ductile, as in Drinking Glass & now Lead added
Hyacinthus the Proto

Of Metals of Alk Gaseous Borax in mutual mixture
Glass run's harder than Chrs one

Lead combined with many of the Metals, when with Iron
a Topaze when Clear Diamond with Gold Ruby &
another red Garnet. When in Copper green Emerald
when with Silver or Sapphire is good a Blue - we have
of Blue.

This probable Hence of our Earth is Adamant

Water always doth have a pure fluid substance
defying formal substantiation.

Pure water impure fluid freezes at 32 degrees of fahrenheit
always evaporates when its surface is exposed to air.

The vapours of Boiling water heated to 212 degrees
of most elastic vapour that will overcome any resistance
of heated bodies of equal bulk or surface

Never absorbed nor perfectly fixed by universal
solvent of all salts in the polarity and is

Never to come at most pure from salts in an
diversified land long transportation to air.

Rain is only plants table to perfection
Tommy cleared from every other substance
Sing Rose Sal is salt are destroyed
by distilled water it pretty perfectly pure

Springs have been not properly applicable to
Dunfries

Man to be such curious solved some
Salts or other substances to have been solved in new
several saps to have been made upon them but
after by improper persons. many things very
from constituent many substances are necessary to
of the Earth

Nitro Lime or its Compound cannot be always
being destroyed when thrown into the Earth they some
partly form

Again there some substances are found to be
not even fixed in water insoluble yet
water, or in the Acids. or any other substances than
are insoluble in water.

more particularly,

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not pb in Europe. I believe

Sulphur Acids are in an Aerial state.

The Acids and the Mineral or Vitriolic can never be found in Earth nor in Water in any instance of any thing but properly decomposed combination.

Other Acids of Borax, Amber, Mur. Vitriolic are only one of Amber only in a particular Oil and Amber itself, the Comp. excluded from Mineral Waters.

(a) That of Borax only in particular parts of Earth not all over it. Perhaps not always to be expected, since find it we may conclude this in Springs Springs or near.

The Vitr. Other Acids are of only two to be generally expected.

The Mineral Acid never generally and Boracic Acid Earth Nature but combined to form Bodies Fossil Vitriol in Sea salt.

Chiefly coagulated to combine Fixed Alkali Metal Metals Acids appear in Mineral Waters.

Fixed Alkali Acid often found in Mines Minerals in large Stones odd or unusually mixed with Sometimes or other Acids degree of acidity. The Vitr. Acids found Mineral Waters. found Decomposed Sulphur.

Alkalies of Earths Fixed Fossil & Volatile Fixed & Volat. Alkalies never found Earth Mineral not to be expected in Mineral Waters nor can expect neither any other Comp. Acids Earth Fixed or Volatile Ammoniac, Nitre &c. and such being to be expected where Acids would on Earth may be justly expected

The Fossile Alkali is only one & that too often seldom found in ~~[illegible]~~ Stones, as alth have great est affinity wth Acids will detach other Substances from them

Fixed are only wth Vegetables & that Vegetable only Alkali is a fixed fossile Alkali, only there the Salts can be found Crude Glauber Borax & Com Salt

The Only metals distillation soluble in Wr or Alcohol Cam't however be found in the Coal Earth Sulphur soluble when made into a Sulphur have often found joined wth fossile Alk in Hot Water

Fossile Oils combined wth Hot Waters tho not dissolved but would slip off any other Oils not be.

The Fossile Oil & Vitriol Sulph & only one found in Hot Waters

Metals all soluble in Acids & therein wth have a Menstrum exposed in Hot Waters but when examined more closely shall find only Arsenic Tin & Copper

Gold can only find in joined wth Gold Ores Quicksilver never wth Sulphur Borax wch is always found Alkali

Much of these Metals are dissolved in Borax Sal Ammo

Gold & Platina are insoluble in Acids can't be found in Hot Waters

Land never found Metals always combined the Sulphur wch has long after lost to be discovered

Therefore Acids Bodies

Its combin^n wth Water and is a perfect Spirit
hence insoluble.
Its combin^n wth Air is decomposable by
Cold. The only one of the 6 combined wth Air
to first combine and wth Water and is nevertheless
Fixed. Never p^d wth Sulphur hence might be
expected
Its combin^n wth Vitriolic Acid is decomposable
wth Muriatic is never p^d and Muriatic Acid
must be concentrated & Boyle p^d applied or
Air will first be dissolved in it.
Nitric Acid but in Water is a perfect Acid
& is not to be combined wth Muriatic like first
& Nitric wth can't be p^d pure
Iron & Copper may be dissolved in these
Acids. Combustibles in Sulphur in
Spirits. Not immediately & Mercury Salts will
not dissolve Acid some Iron & Metals &
Vitriolic Acid.
There is hardly a part of the Earth to any Water
without Sea Salt hence then is decomposition
comes large stones & by a double Elective Attr^n
of Iron & Metals from the Vitriolic Acid
Hence suppose we have Vitriol from Muriatic
Iron and Sea Salt will be decomposed

Sponsible

Phy^s Ostensible can never be p^d as its volatile
and combustible

Brimstone & Coal can's alter analogy
to the Sulphur.

Tinct on being a Metal strength altered
Acids & burning in Alcohol may be p^d in a Metal
of the Other Metals cannot over a Acid & Alcohol

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(a) No Earth except Absorbent is soluble in Water and that only in its Caustic form. Tho' so much of the Absorbent Earth in its mild form is found congealed and is suspended mechanically in Waters and dissolved. Indeed this wch fills down in Copying wells & nurseries worthy wch is put in Green

To discover whether there is an Acid or Alk. use Syrup of Violets or an Acid or Alk.

The Absorbent Earths if we find them in Waters we may suspect the Vitr^ic Acid & we seldom find that but th^ere Earths main Gl^r Salt Epsom Salt & th^e Calc^r Earth makes Vitriolic Selenites

Sea Salt discovered by a solut^n specific chalces wch mutual cloud appear, but Epsom don't appear if Vitriolic Acid is probably united to the Earth or Base

Neutral Salts are discovered by evaporating to Crystallization

(xx) Lead Corrosive Alk. accord^g to Mor^n & yet we doubt whether the Copper or Iron use Corrosive Alk enough is used only to precipitate but again dissolve the Metal. If it proves a fine Blue it is Copper

Arsenic may also be Sublimed

(a) Absorbents are Calcareous Selenites

Vitriolic Selenites (Alum & Epsom Salts)

Muriatic Selenites Muriatic Alum

Muriatic Epsom Salts or Muriatic Magnesia

Glauber's Salt known by Evap.

Vitr. Acid early known late found by Stahl

Ethiopic Oil separates from Sulphur on

Sea Salt known by add. Solution

of Silver, by Nitr. Acid found in Mur. Acid & precipitates

Hydrocyanic may easily be known if combined in other

Metalline Salts may be distinguished by

an infusion of Galls every a purple Colour.

You may know if any of Metals by

Colour & Precip. by Metals

Old Copper Brownish Copper Silver & Lime Water

Gold Now if Acids are in Metal

Drop in a single Drop of Solut. of Silver if any precip.

Mur. made this Muriatic or Nitric Acid.

Lime water by a small Drop every kind

Large Sponge of Copper for Vitriol

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In this we may conclude & state

If it be alk precipitates any thing it must be Magnesia or Earth of Alum, But if this dissolved wont precipitate any thing at all then it cannot be Magnesia we may be sure Salts (viz. Earth

No 58. Particular Salts may be innocently a Precipitant
and fixed Alkalis of fixed Volatile of a whole
Precipitant. Then we may conclude that the Particular
Salts contained in them cannot be the Precipitant. Therefore
The substance or Principle of Volatile Alkali from
the Animal and Metallic Precipitations
of Calcareous Earth may be known by being precipitated
by fixed Alkali but not by fixed or Volatile.

The Mineral Waters formerly described of these
Qualities they contain cannot have little effect
as is made. 8 Grains of Barrels of Iron mixed
to 38 oz. of Spring Water in strong as the Proportion
this can have little effect. Bated Lately Dispersed Regrets
Life cannot more.

Alkali from Water or Salt Water and Muriatic
Acid can be decomposed with hence cannot be
carried far. This Salt Bered Mineral Alkali
that Iron is found in Spring Waters by means of a
double Vessel &c.

Particular Salts do can have no effect
on Particular Things.
Fresh Particular Salts often found in Springs.
Sellantes fully convinced in Spring Waters

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(a) Nor can we say what Elements they consist of, as Gum Arabic for instance we dont call it a Gum Element because on unding is other Gum Elements is decomposed

Some Animals have juices particular to themselves as Vipers Snakes have Venom wch is contained in Cells or particular Bags, but these we shall pass over & confine ourselves to the Human Body

(c) The Juices of the Human Body are of 3 different sorts. 1st such as are perfect Juices as Blood wch is contained in Veins & Arteries 2dly such as are imperfect or not yet converted into Blood. 3dly Such as are perfect & are not putrified & destroyed as we see in the Excrements

The Blood in the Arteries & Veins is not perfectly pure for besides it we find a part not yet formed into Blood & other parts that have been Blood, but are now dead & can not be imparted off when they arrive at their proper secretories

(d) This is proved by examining it thro a Microscope we see fully globules at some distance from each other & tho we cant perceive the other parts of Blood because transparent, yet we conceive them contained but seen tho after we see w of space be taken up by air, so there is no air seen in the Blood, nor can it be a Breathing, as Vessels would collapse if there were a Vacuum.

Another proof is the Blood taken from the Body without any thing being added to it, coagulates from it will spontaneously separate. if red globules mixed in a coagulable Lymph formed serum & lose two may be separated by washing away the Serum so they are seen distinctly.

Prerequisites to fair opinion

Prerequisites to their Sep

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There are several substances wch are not properly speaking Chymic Simple Bodies (a) ~~but rather~~ ~~be classed~~ as Inflammable, Fluidum & Mineral & Volatile Substances.

Indigo separated by destroying yellow call'd Lac pecharation. The other by Sublimation Gums a Resinous Substance soluble in W. little or no Oil in them.
But these belong more properly to Botany shall now here reconsider the Animal Matter. (8)
Wch we have spoke of now of more compound

It signifies not w'h his laboriously Body all diff Substances being fermented into Blood wch is impossible on ye supposition of Dr Mechanic Elements &c

Dr Bartholl (d) seem joined Mechanically not a Chym Solution. Hence such principles are Fire & Red Globules, Gross Lymph & Serum besides there is pushed particles worm & Water

The parts of Blood of perfect easily separate living Hatred Dr'l. The Blood seems to be more perfectly pass thro' of Lungs. Other sooner separates

In order to guide of Inflam Blood we should let Vent in a large Tube & receive it into a Vessel wch may of expose inflation of Lungs, & should not be set immediately into a Cold Air but kept at Warm

The Coagulation Lymph can't be kept in a Vessel but Crusts begin soon

The Blood should have a Air addmitted but ~~not~~ order Vessel & Lungs may be free but it does not make Vent Blood

* The circumstance of separation require very singular [illegible] when of Red Globules appear cannot be guided but the hardness of Pulse

The requisites to this seper.n are that ye Bloodlie mixtt
perfect, & not putrid, as in ye scurvy, or there is no separation
wile take place. But according to ye degree of perfectness
of ye Blood so is ye separation more or less perfect. The most
perfect Blood there is greatest separation that the
Red Globules are even in bigness & separated from ye coagulable
Lymph hence ye Buffy. When the Blood is very
perfect many have said it too thick, & this gave ye
Buffy appearance alledging that this seperation do not
depend upon ye perfectness or imperfectness of ye Blood
but on its thickness or thinness, that when, yeth it
seperated best & not so well when thin, this is very
ridiculous, and they may as well say bis in a very
thick solution & spun treacle will seperate as well as
in a thin one. There is ye same quantity of coagulable
Lymph in a healthy person as in a rheumatic or inflam-
matory Diathesis. yet the seper.n not ye same

* Bodies remarkable in a heterogeneous fluids mixed
together but if one ℞ is in lead quantity will always
appear globular. as ℞ of bis in ℥iv of any liquid. Then
on this principle the Gizzle is globular when ye
(a). fluid when perfect but if the Red Globules are hard in
they dissolve in either serum or Water then serum salts
(b) Hales in his Experiments found it ye same colour in
both Auricles, but is probable a bad Experiment & he might
have succeeded, for in open.g the Chest on both sides of the Auricles
the respiration will be absolutely stopt & yet lies have no
effect upon Blood w.th means available for some time after
the respiration is stopt ye Blood in ye Right Auricle forcing
in this time hard flexed to ye left. M.r H.

Some have said ye colour of the Blood drawn from ye
Vein depended on something in it w.ch sunk from ye top to
ye bottom viz. Coagulable Lymph, & the Lymph came
hard upside down of particles of ye greatest spec. Grav.

The globules form of red Glob seem not to differ from that of any other fluid shook in another liq in wh. it is insoluble with Water and red Globules are in Serum, if Water remains perfect +

Dr Senac's Opinion of Pus is that red Globules are ensiqueles but this appearance may happen from separation of light

The only Objection Gorter lays against this being no Globules is that red Globules are easily converted into Globules in an unknown fluid, it is insoluble thus we see in passing to any Viscid Substance

(a) The red Globules are not soluble in Serum yet easily so in Water, and if Serum contain a considerable Sal Ammon. or any other salt makes water unfit for dissolving the red Globules, hence we may conjecture red Globules are more soluble in Serum as one Serum than another if larger Sal Volat Ammon and more perfect separation of Globules

Hence we see the absurdity of people using Salts dissolve Blood when we see they hinder y Globules dissolving in it.

It seems very odd that Salts should prevent dissolving Globules. Lieut that Soap is made insoluble in Water hence we may suppose red Globules in a saponaceous state contained Oil Vol Alk but this not confirmed by such Experiments

It is a Question whether entirely subtilized may be separated from red Globules as there is found Bile separating in an Acid.

An Acid Colour of Blood probably owing to Air taken in nearly flouch'd Texture of Lungs. (b)

Alc Acid. Metalline Salts Pale congealed or make Blood darker

All of Alkalies make Blood lighter if Vol Alkalin Inert and Neutral Salts Volat Sal Ammon seem to have greatest power of changing Blood to a lighter colour. but not so far as to give it a

would subside, & leave the Blood fluid again but
Coagulable Lymph is so viscid in this time, & allow of
such a Separation I suppose it could, yet if it ever remain
fluid over it as to keep its surface of the same gloomy
Dye it will remain as black as before

(a) perhaps this happens by the Albumen becoming
solid & then of Indigo resumes its native Blue
and may not something similar happen in the Blood
changing its Colour.

(b) If they are fixed they become a resinous Mass
The Blood in a Clam & Anchovis yields a acid principle
as other Animal Substances, viz Vol Alk Emp or Volatile
But if Red Globules are more Vol Alk & Oil than any other
part except of Fat in Cellular Membrane & is almost
entirely expressed Oil.
Blood left in a porringer will putrefy & each part has
solubles in the other.

(c) The Coagulable Lymph does sometimes deposit in any
Body but only where of Blood stagnates not which circul-
ating, tho' if this stagnation happens in the smallest the
Deposition does not take place, but only in the larger
Vessels, as in Aneurisms forming

This not to be distinguished by the Microscope while
circulating from Serum & is notable mechanically
mixed in the Serum, not dissolved in it, because it so easily
separates, as we see in the matter of Inflam. Blood

It is perhaps less specific gravity than Serum
some have imagined they should sink in it but this
this mistake

(d) This is very remarkable

The Vitr. Acid does float but changes ye Blood Black
hence cannot be old to this also Country peoples Blood
is of a lighter colour than in Towns where ye more
Alkal. Acid floating. And ye Blood changed on ye tops of ye
highest Mountains as well as below. (Volatile
Indigo dissolved in ye (Fixed Alk makes a Green
but ye Acid changes this to a Blue. (a)

The Red Globules have very little more of ye Gravity
than ye Serum. Dont deserve probably more than 1 hundred
ye Heart yet do sink in Serum. Celerity of Circul. of ye
bursting & Depels improbable. (b)

Serum tolerat most Oily hence and hoc Season
Heat but cold know that a substance be cover so
inflammable does not generate Heat, nor prevents
it rather as Oil in W. does not grow hot & Oil to
Coach Wheels prevents hot W. & generate

The Coagulable Lymph Reason being exposed
but cold is ye most fluid part of ye Blood then
perceiving its made solid by a Lep. not heat ye
Butter thinnest see by allow Blood separate
in a H. of 9 degrees in W. worse this also separate
from Serum (d)

The Coagulable Lymph when once coagulated is
never to be made fluid, by any Dilution but only
by dissolved by a strong Acid, or Alkali. hence ye
improbability of its being separated by Inflammations
as it could never be again dissolved.
& yet this is the stops Hamorrhages. hence also ye
ill promoted Coagulation of this to stop Ham.
morrhages.

Serum dissolved heals of ye Blood of ye Lungs
specific Gravity. & nothing lungs & Red & lungs stop up
disorder soluble and Vitriolic ye Nitrous Acid
& Alkali when dissolved and Acid & precipitated
by Alk. & vice versa precipitated from Mercurial
Acid is blue like indigo (d)

The Serum is never yet quite pure, nor contains the such heterogeneous parts as are soluble in Water, as N. Salt, Sollen of Chyle not yet made into Blood, & Urine not yet separated, but these are not essentially necessary to Serum as of White of an Egg contained once of it.

Albumen of White of an Egg is not perfectly pure because in Cells lyeth Cellular Membrane, that of this may not corrupt in, & mixed Fragments of Animal & is taken up by Absorption

(C) for they when dilute water again dissolve in Water But this thrown into Boiling Water, looses that little Water & then becomes solid & insoluble in any thing but Concentrated Acids & Caustic

Sept. 62

The Bile is an Egg perfectly similar, and leaves a red blood only, proceed, & alive, and to determine from, and the Matter & Egg &c

The Albumen contained in Bile is being coarse & filtered, imperfectly pure, & hard same properties as Serum

It perfectly unmixed & inodorous, like pearl spread thinly at the Gall gives a pearl & well

It resembles much a Solution of Gum in water, but differs in being an unmixed substance & several properties

The principle Ferment & Spirit of Gum is Sensible to a gentle heat in coagulates but heat & Evaporation; seems to be by a kind of Alcohol as all coagulations & Ferments perish & separate

When coagulated is insoluble except in Concentrated Acid & Alkali in this resembles the Coagulated parts of Blood, but only Gelatinous and Body be coagulated by any Acid and Body. The said to be coagulated in Albumen but this proved not Albumen coagulated when decoction proved been inflated

The Mucilaginous Liquid, also coagulates Serum. The Vegetable diluted in & also to dissolve & coagulate a mucilaginous to dilute nice

The Alkali doesn't coagulate unless Caust & seem rather to Thin it

Neutral Salts also coagulate

The Inflammable Ether & Alcohol coagulate it

Metallic Salts also coagulate whether hence not attenuants.

Cell Earth dissolves & coagulates into Mild form has in Effect.

The Earthy Salts as Alumine coagulate, hence Coagul. Alum. do power this increased in of Alum

The Watery Insoluble Serum is easily separated several ways.

Watery fluids don't seem common only in the Blood the Serum but seem other bilious Urine & Kidney

(a) $\frac{ch}{w}$ are made from y^e Serum.

(b) there are 2 Salts viz the Com^n Ammoniac & y^e Acid of Phosphorus united wth Pot ash.

(c) The Chyle is miscellaneous wth y^e Serum but cannot be expected from y^e Blood Vessels themselves, but may from the Breasts of Female Animals giving suck, & also from y^e Lacteal Vessels but in very small quantity and not very pure but wth some Serum & gastric Juices

(d) $\frac{ch}{w}$ seems like done by to destroy the Coagulable or else the Agitation seems to produce a kind of fermentation perhaps of Volatile nature for y^e L. Juice after this soon grows sower & that much sooner than if no Agitation had been used

Hence a ye of the aqueous fluid is added to the Lymph & Blood that ye otherwise it wd commonly any thing sclaterous stayes longer in ye Blood probably hard & thick making it not so easily filtered thro' ye Kidneys.

The Lymph seems to bind most easily yields & melts most easily seems to be immediately from ye Chyle & Blood & part essential food Nutrit & Ferment. Also proveable that this is made before red Globules & Coagulable Lymph (a) this seems confirmed and Bigelow & Arnd seem to be this wd is absorbed from mother by ye Vessels of Placenta & red ye wd is absorbed & the Corp of Blood seems more difficult that to be brought about like its resolved into this serum ~~or other separated matter~~ by Nutrit action

This serum seems to be inflammable & thus red & coagulated Lymph

Salts (b) seem not often to be found in ye Algorian but some Phys & generally them in ye of the Chyle & seem to be under ye form of red Globules being dissolved in serum

Milk seems very impliciter ye Chyle & Blood & the same fluid. & it is Chyle poni in Serum made (c)

It seems to be Butyrum & ye Cheese & Oil & Vegetable Oil & this separates serum upon top in wd is called Cream but the oil thus in part separated yet still contains ye Caseous part. but is perfectly separated by Agitation (d) & thus ye Butter wd resembles ye Rancid oil generally wd a bitter Sweet oil & this seems not to be altered in ye Sweet & Sweet Herb often on ye Lemon red &c.

Hence neither ye Rancid or Sweet oils seem to be decomposed by ye Stomach but afterwards separated & adipose Membrane

After ye Sep of ye Cream & perfect & Milk retain only Chyle & Serum hence the Chyle is transparent & ye Chyle seems only ye oil purged by means of ye Vessels by ye Secretion in ye Lacteal Vessels

(6) It is then separated into two parts, viz. ye Curd (wch is similar to ye Coagulable part of Serum wch is insoluble in Concentd Acid & Alcohol) and a large quantity of Water contain'd a little Curd not separated & Sugar wch may be got from it by evaporation adding fresh Lime to destroy any visidity or Mucus & then Crystallizing. But yeast wing is permitted lost and the Vin Nectareus fermentation takes place on account of ye Sugar in it, but as there is too much Water in it part of that must be evaporated before ye Fermentation can take place properly, but if this is not done it soon passes thro' ye Vinous, yielding but little Alcohol & the Acetous will soon take place. The Arabians make their Wine thus at present.

We don't know whether the Vinegar thus got is the same as ye Comn Vinegar, but it is most probable being made from almost the same substance.

Not only the Whey but the whole Milk is liable to these Fermentations.

Chyle then consists of 3 parts, — Expressed & Essential Oils of Sugar. & Coagulable part & of Water.

When ye Chyle is formed into Blood ye Expressed & Essential Oils are separated, exsuded into the Cellular Membranes, and secreted there & some destroyed by putrefaction & so off by the Secretories & as the Essential Oils are very Volatile they fly off by the Lungs, the smell shews this, & perhaps some of ye Expressed Oils go to form the Red Globules but Blood don't seem to be absolutely necessary for this purp as all the parts of ye Blood & Humours may be made from Serum & ye Expressed or Essential Oils as is prov'd in

This Chyle passes whole through the exquisite mesentery & glands

The Chyle after this operation seems to be perfectly digested in every condition & then breaks & separates & Whey & Curd is turned into Cheese

The Chyle differs from other animal fluids in being permanently in a Acetous nature for when Chyle or Curd & Sugar, & they soonest turn sour than any other fluids & slow substances & this by an obvious reason that all Vin. ferm. is stopped by a Spirit & viscid tissues —

The Chyle soon after entering the veins is converted into Blood & seems chiefly digested & only parts then Caseous part & Water remain and mixed together

Digestion seems to be a ferm. burning Vin. Acetous & putrefactive but Saccharine.
1st there is no Gas arises although appears in Vin. ferm.
2d Bile and Stomach differ from Bile
3d no putrid matter is passed from
but a great deal of Sugar is turns sole of most putrefactive substances

That Step towards digest. is as much as can be in stomach, as Oleagin is always first acid, so milk is sour & then becomes sweet

There seems sole Animal Juice added to a topic this acid ferm. & probable some chemical entoit known & saccharine substance

After is so much & Bile & intestines destroy & expand Ag. & so rarefy & Bile into parts or & opposite angles & then pieces & Pancreatic & gastric drinks & juice & Saliva & Bile is no probable in order bottom solid & fluid parts & fine & liberation (6) and least

to the nourishment of the Chyle

Chyle [illegible] never seperated in the secretions for we never find it in any of them, Yet is therefore probable that the Serum is formed from the Chyle this serum is the nourishes the animal. And this is analogous to what we observe in vegetables we have seen made preparation to their growth or formation of new parts. From the Serum then the red Glob Coag. Lymph. Bone Muscles Tendons & all parts of the Body are formed.

(6) The way digest. is principally the secretion comm. yet this does not take place in the Stomach but only the Action first necessary for the formation of Chyle

The Food when taken in is first mastication & ground fine & diluted w. the Saliva & in the Stomach meets w. the Gastric Liquors & is here warm & stable begins agitation so that these liq. get every thing fine here from the Food. As soon as the Solution has taken place a Fermentation begins & they are changed into a substance having different properties what they had before.

Here we have no signs of a strong fermentation nor is it of consequence whether or no it be similar to that certain it is however that it is similar to it. Action for if the Stomach is weak we have the Food ferment and a Sour smell & this is converted into an Acid Liquor as is apparent by the Belchings. When the contents of the Stomach get to the Duodenum they meet w. the Bile & Pancreatic Juice w. stop the Acid. & are themselves destroyed rather decompos. by the Acid. The bile & pancreatic Juice are united by the Saccharine ferm. not take place & they are formed.

Lakes in low flat Countries wapor rising carry up
Animal Effluvia substances which putrefie and Air
Cause fatal Diseases

The Effluvia of Bils on Animals differ not only
other Effumals but from those of same species not
evident to our Senses but to Hounds &c

The Vol Alk when mixed with Men Acid is
not Vol alkle and Amm Heat hence People says
hartsh Superstitious Vol Alk &c thrown off.

Inflammation &c don't seem to be caused by the
increased Impulse of Body by Perspiration being obstructed
but by the obstructed small Vessels, the Nerves and
blood ing &c to the great Vessels.

Perspir goes most on and hence the Chyle
is forming rather most after Dinner
the 2 other Excretions which however seems only to be
part of the Bile Hundredth food is by Intestines

Urine consists of Water, Salem, Acid Stum
dissolved in it and an Oily substance seemingly dissolved
Water upon Butterfly lets fall a Sediment the is
Urgum out which lessens forming Blood. And Urine also
settles upon Standing lets fall a Sediment
In Diseases the Sediment is not in Urine and Cold
Fits but when the Vessels are relaxed after Cold Fits
Hence we judge the Circulation being less interrupted
Vessels relaxed whence Sediment is more
But when that is a Delirium offense or to small
and Vessels which matters are to be secreted, but suppose
in a relaxed like substance this generally fatal

All secretions are separated by a very simple Apparatus
viz by filtration.

(6) The Quantity of that Serum often differs, in being more or less diluted wth Water.

The Salt is chemically dissolved in ye Water.

Secretion happens from ye Water in ye Blood being converted into Vapour, viz in Perspiration arising from every part of the Bodies. this Vapour does not carry off any of the Salts wch are not so easily volatilized as the Aqueous Vehicle.

But when this Vapour is stopped from flying off, more perspiration obtruded, then ye Urine is more Saline in proportion

Dr Hales Accounts fond diff^t Saltness of Urine

Besides this there is some other salt viz Acid of Phosph^r & of Alk.

There is also in the Urine other Matters wch are insoluble with yet pass off by the Kidneys in an exceeding fine powdery form as they are insoluble in Water yet is so very fine as to pass thro ye filter & upon standing will as perfect in form of deposit, or sediment, so in this ye insoluble parts of ye Blood wch are destroyd by fermentation.

Besides these substances always contained, we occasionally meet wth others in ye Urine as in the Diabetes when ye pores of the Skin are relaxed the Serum sometimes & also sometimes Coagul Lymph & Red Globules are mixed by boiling of Urine. This is thus ye Urine is often Bloody

We have also all such as adventitious salts happen to be taken into the Body & are at least soluble in Water & not decomposed in ye Primae Viae

Will ye Perspiration carried off Alcohol & Spirituous Liquors & Ether volatile in a little Steam & thus Rash off by ye Lungs, hence by the Breath we may often tell what a person has taken. Lots of any tainted Matter being carried off, thus this fine not salt urine & matter such — Stinking wind Body is thereby but partially cleared

No 5 Urine is very putrescent but not more than other Urines or very little being add to have habitual in it.

A Retained Secretion related by many and after some time a putrid Fever was born

The Mucus is insoluble in W: wth dried imbibes W & seems dissolved but only bears pure consistance. Upon Vapor^n it leaves a substance similar wth of serum which often &c Dry

When scraped or mixed wth Bubbles other in^ts may burst superficially lower than W but these being separated it sinks in W.

When putrid or scraped dissolved or his [illegible] Hence it may be taken for Pus in Consumptions and [illegible] as well as Juice. For their [illegible] formed and Lungs but only towards end attended of [illegible]

The Mucus Coagulates by d^o means by Lemon or d^o Vinegar Gum Egg &c.

After Coagul^n is soluble with Caus. & the Concent^d Acid of Vitriol or the Salt of Caus Calc^d with Vinegar it is impossible to bring d^o Lime W in d^o Bladder in d^o Purpose of Mucus. & gravis then easily irritated.

Carbles of d^o Calcs can't dissolve d^o Mucus in Argenous hence not used for such purposes

This Mucus is much akin wth Coagulable part of d^o Serum & Eggs. but differs in hard its Water soon separated. ✓

Albus & Pancreatic Juices seem to differ from d^o Mucus only in being separated in greater Quantity & not remaining so long on their glands or become as thick as this

The Matter secreted by Inflammation is only a residuum of Blood by a small quantity of Mucus after separation of the Chyle from Blood.

The next separation is where the Saliva is large enough to let thro' the Serum & also the same substance and Albumen, & the th of more watery parts go off into Third another filter, & hence the Serum and perspirable and Mucus of Glands & Parotides Salivae is nas more Water & this w contains Salts also, but upon standing of Water & Salts are absorbed and the Mucus and is large effusion hence in the Fauces is at first acid but upon standing becomes Mild

These 2 Juices have nearly the same properties by tests & this resembles agreeing also th the Serum being coagulable by heat when concentrated & Alkalies & Acids.

They have one properly the greater degree than of Serum itself th is being soluble th only a certain quantity of Water, the Serum being capable of mixing th almost any quantity but more perfectly th only a certain degree whereas th the Mucus attract more th only a certain quantity of Water & Saliva more & Mucus less.

They putrify soon on account of the is keeping no Salts probably. Gold & some by Chyl. & Serum only leg Vol Alk on acc of their want of Water

All this Liquors will putrifie if wch is added to ye own is evaporate, but don't seem to be more putrid than other animal substances

The Bile differs from all other Juices but some nearest to the Globules

Is soluble in the dissolved powder mucus is coagulable seems to be soluble in the Urine Gall Blood has at least coagulability

Has been tried by many tried by upon the pat does not seem to be more so than other animal juices in an Ext^t upon it & dissolved perfected room of our wd viscidity perhaps opened Bile prevent its putrefaction

Upon Copp^s of Acid is subtilized step wth only or reinous is of diff colours from diff Birds and is very fated when exposed after sep^n of the Bile and is upt least putrid the Acid heads acidity a good deal destroyed however good use of the Bile in digestion neutralizing the Acid generated by it is made sweet

Its dispos^d of by substances and yet^n is only perhaps Bile viscidity & sodae Soap wch does better than Bile but Bile better than gum Arabic

The Bile also makes the Bile parts to be suspendable and Chyle.

Probably red Globules are converted into Bile passing thro' the Pori Biliarii; for that the red Globules are capable of being first over filtered & strained thro' the Liver i.e. the Vena Port

Injections seem to prove it as they pass from the Vein into the Pori Biliarii. but by injecting any other Gland the Filter is so fine that no Injection will pass into the secretory vessels consequently the filter of the Liver is much of a larger size. the Glob^s are probably changed into Bile in the Pori

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Bile is not only made by a deposition or Filtration as ye rest of ye Secretions are, but a permutation wherein takes place for ye Bile is very different substance from anything yee find in ye Blood

It is certain that ye Blood goes to ye Liver more saturated wth Red Globules than to any other Viscera for by the Double Circulation in ye Mesentery the Blood is deprived of its thinner parts yt are secreted into the Peritoneale Pouch &c Besides this a great quantity of Lymph is separated from ye Blood before it goes to ye Vena Porta Biliarii & Lymphatics by ye Lymphatics is very numerous in the Liver

The Red Globules also probable are converted into Bile as ye resemble ye Bile most of any part of ye Blood in containing most oil &c

In order to understand Double Electric Attractions and their Explanation by ye Diagram Tab. ye 1st & 2d Scheme

Let M. stand for Mens.tm

S - - - - Solvent
- - - - Attraction
+ - - - Prisonmore
— - - - Menes orlife

1st Table

1 S	2 S.	1 M	2 M
1 M	1 M	1 S	1 S.
2 M	2 M	2 S	2 S.

In this Table the 1st Solvent & first Menstruum have ye greatest Attraction for each other & the 2d Menst.m of 2 Solv. ye least. as this is in Tab.e Tab.e

2 Table

1 S	2 S	1 M	2 M
2 M	1 M	1 S	1 S
1 M	2 M	2 S.	2 S

In this Table ye 2 M was a strong Attr.n to ye 1st Solvent

3d Table

1 S	2 S	1 M	2 M
1 M	2 M	1 S	1 S
2 M	1 M	2 S	2 S

1 M → 2 S. greater 2 M → 2 S
1 M → 2 S less 1 M → 1 S

1 M → 1 S. 2 M → 2 S
2 M → 1 S 1 M → 2 S

Prop. 1st The intermediate Attractions we hence from Experiments are stronger than ye strongest & weakest, excepting the Attractio Fixed is ye strongest Menstruum & One ye Earth ye strongest Solvent

1 M	→ 1 S	greater	2 M	→ 1 S
1 M	→ 1 S	greater	1 M	→ 2 S
1 M	→ 1 S	greater	2 M	→ 2 S
2 M	→ 2 S	less	1 M	→ 2 S
2 M	→ 2 S	less	2 M	→ 1 S
2 M	→ 2 S	less	1 M	→ 1 S

1 M → 1 S are not differ so much from the
1 M → 2 S. as 2 M → 1 S than from 2 M → 2 S.

1 M → 1 S + 2 M → 2 S is less 2 M → 1 S + 1 M → 2 S.

1 M → 1 S + 2 M → 2 S − 1 M → 2 S less 2 M → 1 S

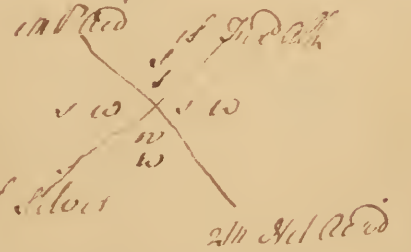
1 M → 1 S − 1 M → 2 S is less 2 M → 1 S − 2 M → 2 S.

After endeavouring to explain how the attractions will take place I now endeavour to shew it more particularly by the Diagram.

The 1 Mr we shall call Red & 1 S.: Fixed alk.
2 Mr — — S Red — — Silver
Then as before the Mr will stand thus
in Table

1 S Fixed alk.	2 S Silver	1 M V Red	2 M N. Red
1 M V Red	1 M V Red	1 S F alk	1 S F alk
2 M Nil Red	2 M N Red	2 S Silver	2 S Silver.

Diagram



Case 1st The stronger Attrs are represented by S. & weaker by W and from the 1st Rule the 2 intermediate attractions viz the 2 S & 2 W will be the strongest & overcome the strongest & weakest represented by the S & W's so that the Vol Red & Silver will be united & the Nitr Red & fixed alk

Case 2 But by means of their weak Attr the effects of attractions of bodies the contrary will happen from this principle viz that the difference between the middle attraction & the least will always be greater than the difference between the greatest & the middle one. Ex gr Vol Red 3 S fixed alk

A mixt of Red & Alk to be Fixed alk. 3 8/3 12 Vol Alk to Red 1 8 Nitr Red Silver Nil Red
Red & Alk also then the Nitr Red & Alk to the Silver must be before

(a.) as the difference of attraction is here so great so that
cannot vary the force in proportion as the attraction between
the bodies taken is beyond the other attractive between
in proportion. Draw out off an equal degree from
each as a.b. in each side of the scale by a line then the
will appear still plainer that the strongest attractions
act on conjunction.

than 4 it is therefore with B. Now if the act be applied so as to determine which these attractions suppose 4 to 8 that the B is equal to more than four it is therefore they will be B. & the second attr.n should be determined in proportion that it must be nothing (& this indeed) so that the strongest attraction will be that between Acid & Alk. represented by 8 which exceeds the two intermediate ones taken together represented by 4 & 4 which make only 6. & as 8 exceeds 6 so the attraction will take place. & as the attraction between Acid & Silver is greater than that between Volatile Alk. it will be forced over by the Acid and the Silver remain in a Cage with the Acid & Fixed Alk. in a vitriolated Tartar.

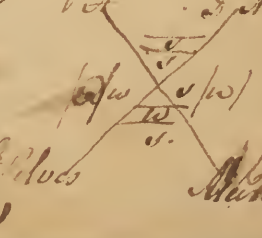
If the Silver had been Volatile or if the Volatile Alk. was used instead it being separated would fly over also & cooling in the receiver would unite with the Acid & the Fixed Acid & Vol. Alk. thus treated make the ~~common~~ ~~Tartar~~ Sulphur Mineral in a solid form.

Case of B. of Double Elect Attn.

Let us place of Marine Acid in place of the Nitrous and then it will be thus.

1 S. Fixt Alk.	2 S Silver	1 M Vol Acid	2 M Mar Acid
1 M Vol Acid	2 M Mar Acid	1 S F Alk.	1 S Fixt Alk.
2 M Mar Ac	1 M Vol Acid	2 S Silver	2 S Silver

or by a Diagram thus



In this case we have a stronger & an intermediate attraction acting against an intermediate & a weaker, so that the Vol & Fixed Alks & Silver & Mar. Acid will be united. (a)

To make Sal Ammoniac

Exp.t 1.st Jan 27 1761 ℔ℓ. ℥iii of Vol Alkali found upon ℥j of Spir. Nitri dul. saturated in it was evaporated in 12 hrs to abt one third, this taken off & set by to crystallize, the st. shot out horizontally and bottom of Vessel, forming Crystals wch appeared stellar afterwards upon stirring all the liquid together all liquid was drid on a piece of paper slowly before the fire taking care it should not burn. It hath deflegmated marcasite crucible fore

Exp.t 2 Jan 28 Wet day — Weather Clear.

Took a crucible after making it red hot to drive out all Spour & cooling weighed it then making it red hot again melted init ℥j of Nitro in Cage Crystalls over a fire — After cooling it was put into a scales to the Crucible & found to have lost only 2 grains of its weight.

Exp.t 3 ℥j of Sal Glauber in Crystalls was put into an Earthen Cup & placed on a Sand Heat, wch soon dissolved & Alkali first evaporating to Dryness first in Sand heat & afterwards in a crucible it was found to have lost ℥ij gr xvi of its weight, only ℥j ℈j gr iv remaining —

Exp.t 1.st The same ℥iii as related in Exp.t 4 yesterday — being deflegmated to charcoal in powder, wch would deflagrate no longer, yet wch still flashed & deflagrated, carrying away ℥j of Vol Alkali wch is supposed due only to a red hot phlogiston consequently what flashes was nitrous common Alkali wch was left behind is being washed into specially in warm water, the liquid was evaporated in a gentle heat to a proper dry fixed Alkali ℥iii ℈ii was obtained —

To make

To make Solid Phosphorus

Take one ounce of Allum powder'd & mix wth equal
parts of Calcinated Flowers, any Lenim^t^ or Vegt^ Oil
Chaff and &c. put them in a Viall closely corkt^d^ & so close stop
the pores & expose it to the Sun. Crucible is one of very hot flaming
are fully powd^r^ & are not burn'd in the fire. Cover the
w^th^ [illegible] in the heat for some
time by wch means ye Allum will obtain a fire from the
Phosphorus. Take it off & ye Viall will be much cracked
after another Calcination in the mouth of the Viall
[illegible] share the Phosphorus [illegible]
Viall [illegible] reserve it for use.

A little of this shook out of the Viall on a warm hand
will blaze [illegible]

[illegible]

[illegible] Gaudy [illegible] common [illegible]
[illegible] Dwarf in the [illegible] Chm
[illegible] Crucible [illegible] not [illegible]
[illegible] Gold [illegible]
[illegible] Gold [illegible]
[illegible] upon [illegible]

[illegible] found upon [illegible] of the Devil
[illegible] Sulphur [illegible] South East to [illegible]
[illegible] Chimney [illegible] Bottom [illegible]
horizon [illegible] Star afterwards [illegible]
[illegible] Called Solid Immaniac
[illegible] one hour [illegible] fire [illegible]
[illegible] — [illegible]

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in an 63 of Arbe 23 x 63 40 of fixd Degrees
and 23 x 63 of Arbe Reid

[illegible]

[illegible] fire [illegible] Solution [illegible] Solution [illegible] Water. [illegible] [illegible] fire without decrepitating [illegible] Salt upon [illegible] and [illegible] [illegible] Salt [illegible] Salt [illegible] Solution [illegible] Water [illegible] 32 grs of its weight. (At the reason [illegible] water in this case [illegible] [illegible] so much as that was, [illegible] quantity of [illegible] salt [illegible] more Water [illegible]

5) Found on Bini[illegible] fixed Vegetable Alkali [illegible] in Operation of [illegible] quantity of Nitrous Acid as was [illegible] then evaporated to dryness, so as to obtain a quantity of common Nitre [illegible] to Dissolve off the superfluous Acid — The Nitre thus obtained was weighed in [illegible] Evaporation was made, then [illegible] Nitre [illegible] weighed [illegible] Grains of the Nitre was 3x 9ss so that we find in that quantity of Nitre there was 3iii 9ss of pure fixed Alkali & 3ii 9ss of Nitrous Acid. That is (a)

Sept 9 Dissolved a large ℔ of Vitriol Tartar left after of
Feb 3 Distill'd of 9 Vol. Blood in boiling Water filtred &
had given proper Vessels to incorporate the
Spirit & were formed then dry & Crystal. thoroughly before
a gentle fire weighed 1 ℔ 3 ounces & being put
in a Crucible that had before been heated to redness yet
ale moisture & covered it with a small one to prevent
it salt flying off it was perfectly decrepitated, in a pretty
strong fire being reduced to a dry powder by the Heat of
a fire & weighed again it was found to have lost
ten ounces of its weight —

10 Dry air moderately warm. dissolved a quantity
of Nitre & Sal Gemmae in Water, & when cleare
filtrated & evaporated in Bolt head Crystals were formed
by them based a Gentle fire thoroughly, & putting
them into a Crucible heated in ye fire above weighed
it to a perfect decrepitation in an intense heat it was
found to be 28 grains lighter so much in Sal Degemmae
sylv. there is lost 3 ounces in decrepitat. one ℔ i.e. there is
3 ounces of water in a ℔ of salt.

Took 3 ℔ of Sea Salt & 1 ℔ of the Cubic Nitre
11 by adding 3 ℔ of ye Nitre, afterwards separated the Cubic
Nitre from ye common Salt, it remained undissolved
by dissolving them in Water, evaporating partly the
the same of the Sea Salt was crystallized, then pouring off
the Liquor clear off ye Salt let it cool & found the Cubic Nitre
crystallized at ye Bottom of ye Glass & poured the superfluous
liquor from ye Crystals wth a gentle Heat before the
fire then took ye ounces of this Salt & put it in a Crucible heated
& weighed as above smelting ye Salt by putting the Crucible
in the fire found it had lost 28 grs of its weight —

Exp. 12. On Sal Ammoniac

Feby. 4th. A quarter of an Oz of dulce Sal Ammoniac was put into a Phiala
filtrated & evaporated it in Balneum, till the Crystals
drove off the superfluous moisture from the Crystals by drying
it before a gentle fire then put it into a Crucible & Water
weighed above 2 gr, afterward decrepitated
the salt by setting the Crucible over a clear fire till the decrepitation
was over & weighed the Salt and found it had lost 1/10
of its weight. But this Exp. could not be made so exactly as
the preceding on account of the Salt flying off
before the decrepitation was perfectly finished —

13 On Sal Ammoniac

Dissolved Sal Amm. in Water filtrated & evaporated
& crystallized it then did it before a fire till the Crystals
were perfectly dry — Zi of this we put into a Baron of Brass
& exposed to such a degree of heat as to dry it thoroughly
by without sublimating the Salt. upon weighing it was found
to have lost Di —

14 We could learn nothing by this Experiment
only that it was as volatile as Water alone —
The Regenerated Tartar being exposed to a degree of heat more
moisture from it, but it is impossible well to dry its Crystals
so we can't say how much Water is in order of this Salt
viz. of Nitr. Ammon. put in a hot Crucible & flux immediately

From ye Result of ye preceding Expers^ts

Feb 28 9	℥i of Salt of Tart^r ℥iii^or of Kali	Comb^n composed of Nitr^l Acid & fixed Veg Alk	contains ℥ of Water in its Crystals
Mar 1 4 8th	℥i of Com^n Nitre in Crystals from my Shop	is composed of Nitr^l Acid ℥iii ℈xvii ℈ii including Water & Fixed Veg Alk ℥iii ℈viii	℥i contains of Water in its Crystals ℈ii
Feb 28 10	℥i of Sal Digest^s Sylv	ch^ch is composed of Mur^c Acid & Fixed Veg Alk	℥i contains of Water in its Crystals ℈xxxvii
from Dr Boyle's Remarks in ye preced^g page	Prec^p in Tart	composed of Vegetable Acid & Fixed Veg Alk	can't say how much Water is contain'd in its Crystals as upon being exposed to fire they all evaporate
Feb 28 3	of Glauber Salt	Vol^l Acid & Fixed Alk	℥i contains in its Cr of Water ℥viii ℈vi
Feb 11	Cubic Nitre	Nitr^l Acid & Regular Alkali	℥i of its Cr contains of Water ℥℈xxxviii Water ℈xxii
Feb 28 4 6th	Comm^n Salt Sal Gemm	Mur^c Acid & fixed Alk	℥i of its Crystals contains of Water ℥xxii ℈ii which perfect Salt ℥℈ii but Crystals of Glauber only ℈xvii
6th	Polych^t of Stochel^s	Veg Acid or Tartar & Fixed Alk	contains of Water in ℥i of its Cr ℥ii
12	Vol^l Com^n	Vol^l Acid & Vol Alk	℥i of its Cr contains of Water ℥xxxvii
1 8th	Nitr^l Com^n	Nitr^l Acid & Vol Alk	decay in a Vial where some are can't tell exactly Water is contain'd in its Cr
13	Com^n Comm^n	Mur^c Acid & Vol Alk	℥i contains of Water ℥i
Remarks and Commentary	Spir Mindere	Veg Acid & Vol Alk	Crystals volatilize and I know what Water it contains

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Chrystalls not always of same form of same Chem^c Elem^ts. as Topaz Asbest.

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Neutral Salts Lig i

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